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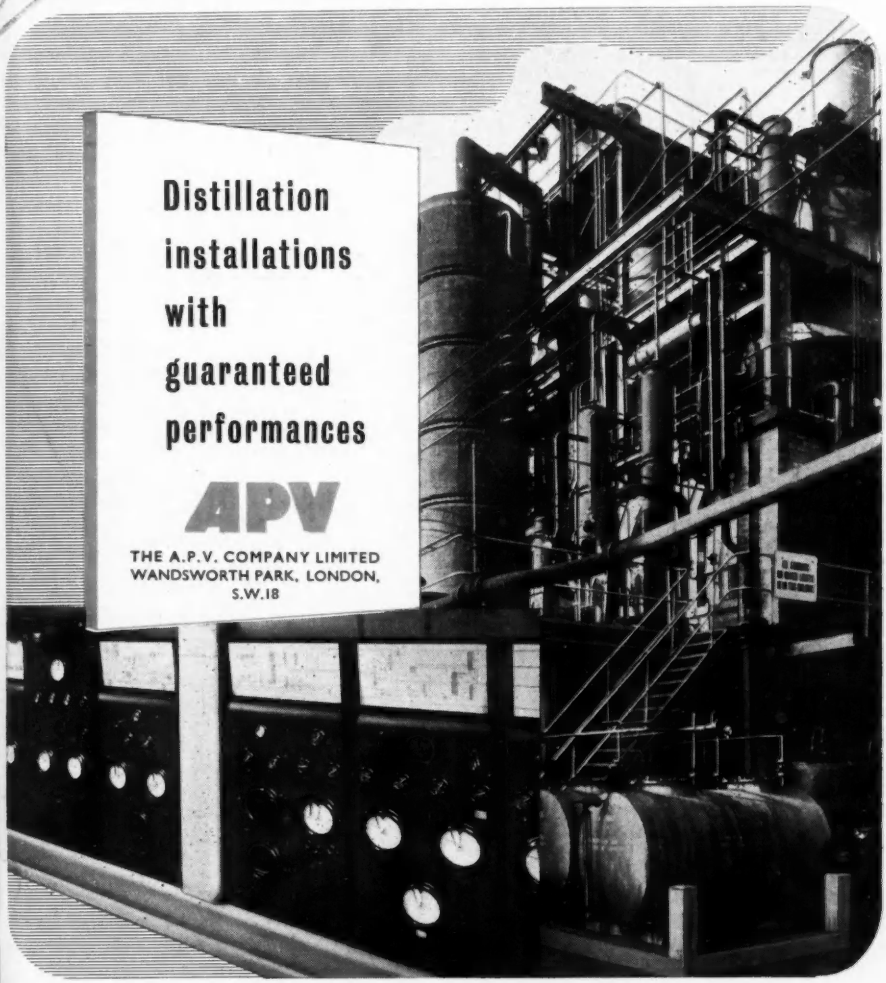
VOL LXI 29 OCTOBER 1949 No 1581



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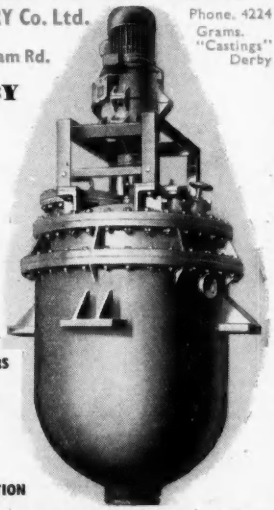

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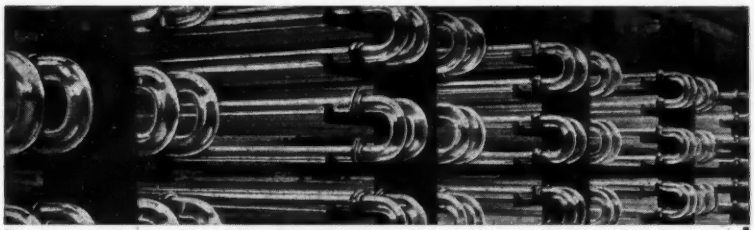

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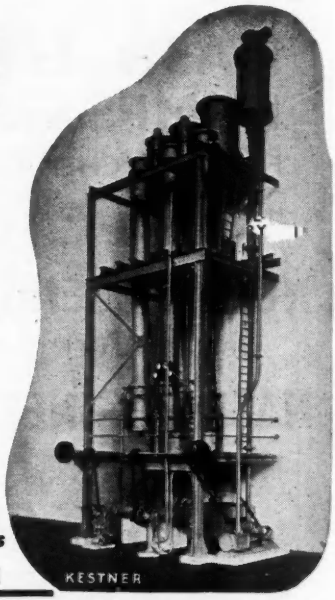

In a recent issue of the American publication " Industrial and Engineering Chemistry " two acknowledged authorities, Mr. W. L. Badger and Mr. R. A. Lindsay, wrote that " The war has accelerated the change TO THE OUTSIDE HEATING ELEMENT, forced circulation design for salting operations, and to the LONG TUBE VERTICAL design for non-salting operations."

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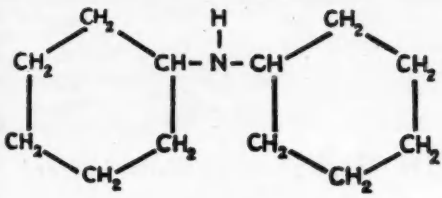

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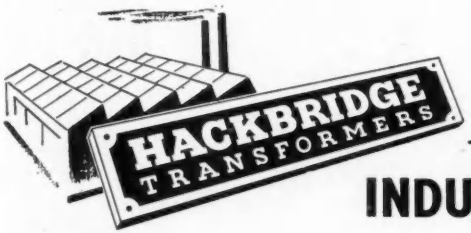

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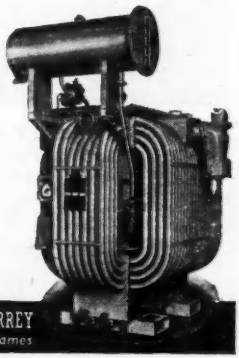

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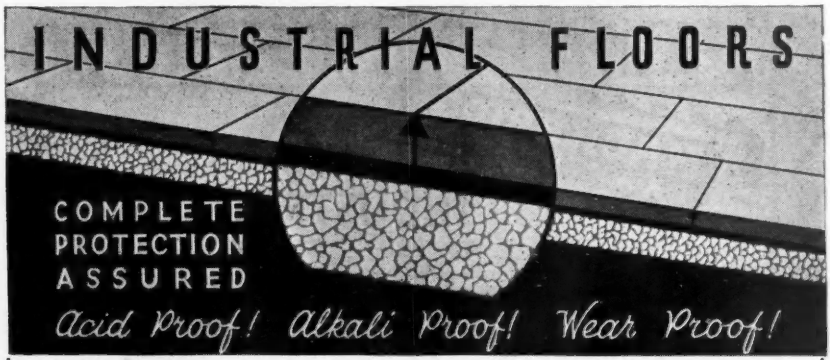

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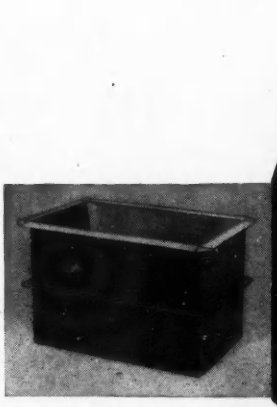

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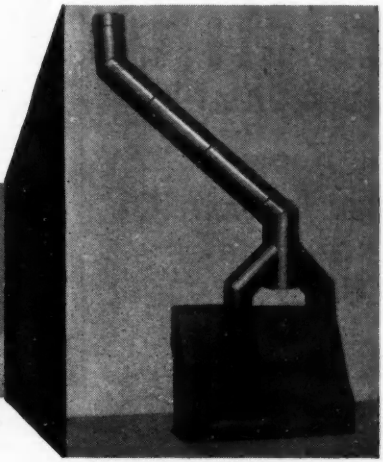

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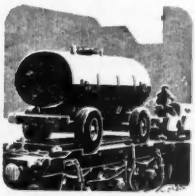

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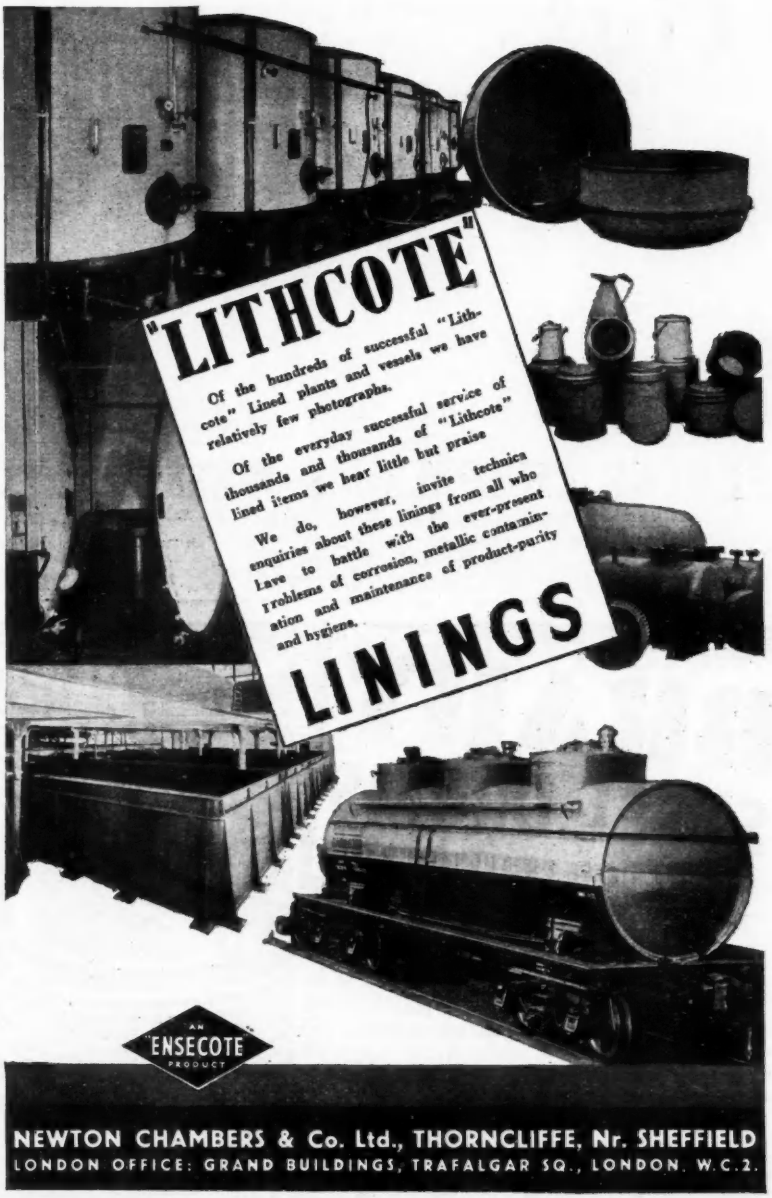
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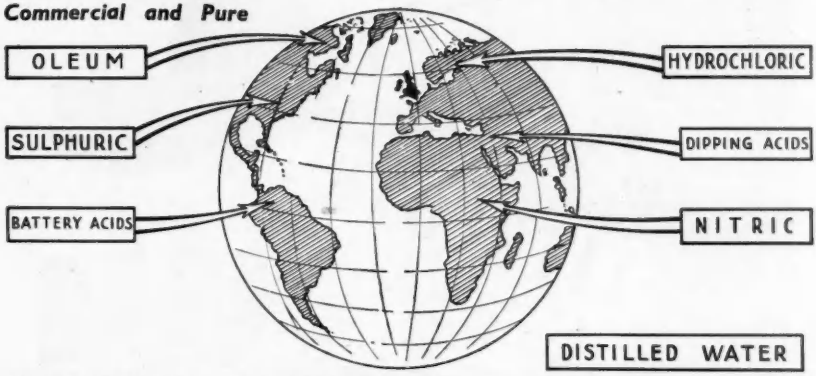

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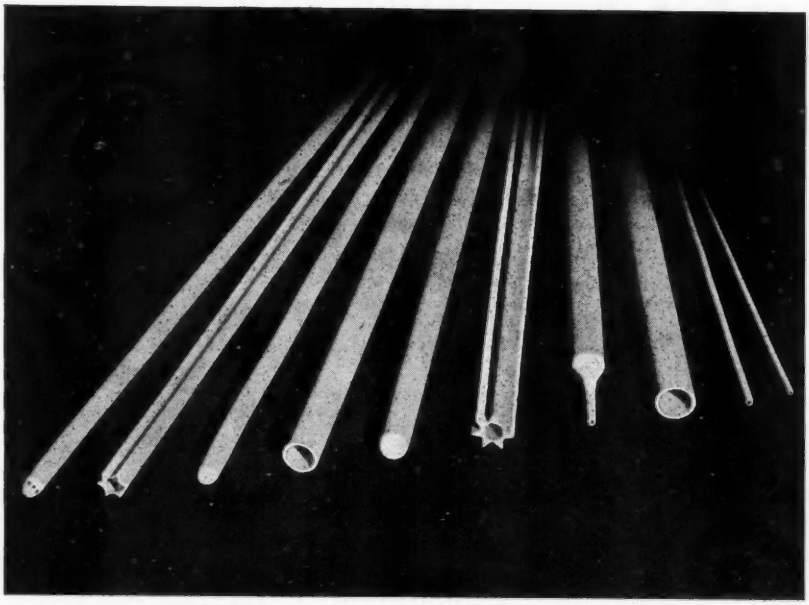

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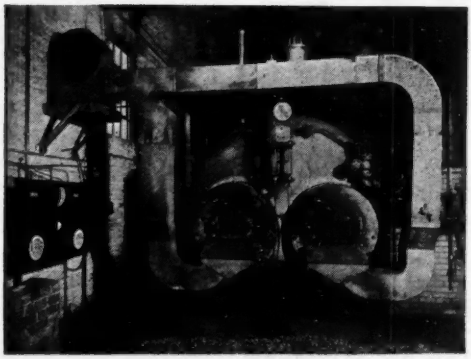

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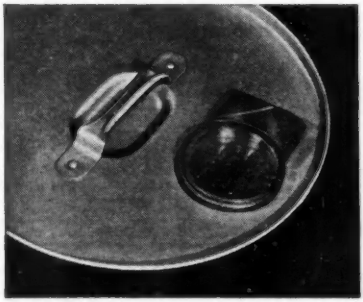
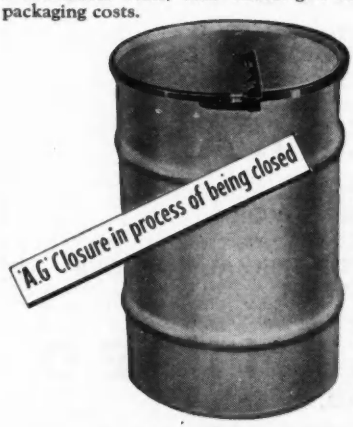


New patented handle

The new handle with smooth turned back edges prevents chafed and cut hands even when carrying a heavy drum. The appearance is greatly improved and the strength and rigidity considerably increased.



New double-secure "A.G." pattern hoop closure

The new patented A.G. hoop is a major development in closure design for the larger full aperture drums. Neat in appearance, it has minimum projection and thus facilitates the rolling and stacking of drums and reduces the risk of damage. It can be opened by a simple upward motion and is snap-closed without the use of tools. It incorporates a special tightening link and further, it will remain securely closed, even if the rivets are accidentally broken by rough handling.

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Volume LXI 29 October 1949 Number 1581

Oils and Fats

LITTLE is heard just now about a subject which, less than a year ago, loomed so large that even the general public gained an uneasy inkling that all was not well. That, briefly, was the shortage in most parts of the world of natural oils and fats, notably the vegetable ones, and the inadequacy of nearly all the schemes for satisfying that growing hunger. A year has gone since the chairman of Lever Brothers, Ltd., awakened some sleeping dogs by his clear-sighted picture of what are the world's minimum needs of vegetable oils, principally for food and for soap, and how poor are the prospects of their being fully supplied in the foreseeable future. The portents are almost all to the contrary, and whatever hopes may first have been raised by the African groundnut schemes are now, for the time being at least, completely deflated. There will be no useful increment of nuts or of oil from Kongwa or the other African territories this year or next, and although there are favoured areas around the world where nuts and oilseeds are as abundant as ever, those vital crops come more and more reluctantly to the oil mills and refineries in Britain and the other countries which have traditionally left it to others to raise the crops.

The groundnuts scheme, whose dismal early results—magnified by contrast with the callow optimism of some of its Parliamentary sponsors—do not encourage a fair estimation of what it may ultimately confer, and the determined and widespread efforts made to win from the sea acceptable substitute oils for food and industry, such as herring oil, both recognise how little reliance can be placed on the odd sources of oils and fats to replace what is now absent from the normal consumption schedules. The shortfall is succinctly expressed in the round figures of Western Europe's imports of oils and fats last year. The total is considered to have been 2,296,000 tons, which is almost exactly 100,000 tons better than the total intake in 1947 and yet represents only 63.5 per cent of what those countries were accustomed to receive before the war. That record tells almost the whole story, since Russia is as usual not a party to such international accounting; world exports in 1948 were only 2,933,000 tons, so that Europe took nearly all that was made available for shipment. By the end of this year 200,000 tons more may have come into the world markets and there may have been another 270,000 tons by the end of 1950.

Those are the estimates given in

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The annual subscription to THE CHEMICAL AGE is 30s.; single copies, 9d.; post paid, 1s. SCOTTISH OFFICE: 116 Hope Street, Glasgow (Central 3970). MIDLANDS OFFICE: Daimler House, Paradise Street, Birmingham Midland 0784-5). THE CHEMICAL AGE offices are closed on Saturdays in accordance with the adoption of the five-day week by Benn Brothers, Limited

Brussels this year to the International Association of Seedcrushers by its secretary, M. J. C. A. Faure (*Oléagineux*, October 1949, 567-570). That expert thinks the best hopes of increase are to be found in Africa, North America, Indonesia, Malaya, and possibly the Philippines. It seems that the vast possibilities in South America, notably in Brazil and the Argentine, are very far from being realised, even partially, in the near future. Although considerable stocks have accumulated in the Argentine, the prospect that any large increase in the agricultural products will come from there is rendered remote by the two keynotes of that country's economic policy—the determination to sell processed goods rather than raw materials, and a passionate desire to get the highest prices that scarcity will permit.

While Argentina seems to have outstripped all others in extorting whatever the needy can be made to pay, no large producer of vegetable oils is likely, while present conditions prevail to accept complacently the relatively easy terms on which United Kingdom contracts were based in the past. Ceylon's Minister of Commerce, lately returned from discussions in London with Britain's Minister of Food, has observed that sellers' prospects are good for some years hence for copra and coconut oil, for which this country's contract expires this year. The U.K. delegation which is to seek to establish another long-term contract in Ceylon next month will have to take into account Ceylon's intention that prices shall be sufficiently ample to rehabilitate her coconut plantations. That policy may in the end be as important a factor as any designed to improve world nutrition, but it is likely that the first to benefit will be required to supply a large portion of the cost.

The scale of post-war price increases may be gauged by reference to one item above, coconuts, of which some 600,000 were to be shipped to the United Kingdom this month from Colombo. Fresh coconuts were being exported in 1945 for Rs.60 per 1000. In 1947 they realised Rs.150; today Rs.421 per 1000 is being paid.

The sympathetic movement which has been exhibited by all is no transitory affair or one likely to be halted so long as the needs of populations and of industries continue to expand very much faster than the means of supplying them.

Notes and Comments

Trade Before Devaluation

A NARROWING of the flow of export and import chemicals is shown to have occurred in September in most of the larger components of international exchange. The total effect on the export account was to reduce to £6,994,535 the receipts for all the chemical groups, which in September a year ago brought in over £7,519,000. Characteristic of outgoing and incoming totals was the reduction of dollar transactions, most conspicuous in the U.K.-U.S.A. accounts. Sales to the U.S.A. of all chemicals within the Board of Trade classification realised in September £134,366, against £230,829 at the same time last year, and even more substantial was the cut in our American chemical imports from £819,320 in September 1948 to £418,698. It is fairly evident that no kind of stockpiling was resorted to here in the weeks immediately before the "revaluation" transformed the relative values of British and American chemical products. The current export tables tacitly point a lesson to which little attention is generally paid in public pronouncements on export trade objectives. That is the steady and substantial trade (in chemicals) being maintained with the Scandinavian countries, the Netherlands and Pakistan and India, notwithstanding India's premature hopes of replacing with home production the industrial products of the West. Argentina and Brazil continue to be substantial buyers of British chemicals, a custom which the new currency relationship should not weaken.

Fuel Oil and Steel

RISING fuel oil prices in the shipping industry has been noted with concern by industries in Scotland which switched to oil. There has, fortunately, long been an increasing reluctance to venture on such conversions, the bulk of which were carried out soon after the war under the impetus of Government encouragement. Such firms may now face a serious increase in power costs, since most have in recent months been merely holding parity with others using conventional fuels. It is regarded now as certain that prices for industrial fuel oil must rise, probably to the same extent as marine oils. The steel industry in the West of Scotland converted to oil at very considerable cost and will now be caught in any upward trend. Colvilles, Ltd., uses fuel oil at its Motherwell and Clydebridge melting furnaces. This conversion was stated at the time to cost £1 million and adverse comment followed when the Government abandoned its earlier encouragement of the conversion policy. This present situation again emphasises an unwelcome effect of Government policy on industry and contains a definite threat of increased steel prices. Increased prices for the output of steel-using industries is regarded as inevitable if steel is advanced in price. Any such result would be particularly unwelcome at a time when effort is being directed towards a lowering of all selling prices.

"Token" Retrenchment

THE Prime Minister's accusation in his statement on Monday that the nation was not going "flat out" to gain economic recovery might well have been directed at the Government itself. It is not going flat out either. One fact that emerged clearly from the sketchy outline of the Government's plan to make economies of £250 million—more than half of it to be gained, gradually, at the expense of capital expenditure—was the failure to grasp the nettle. The moment when drastic measures might have been accepted with equanimity was lost, and the exhortations to produce more may well fail entirely to drive home the urgency and the gravity of the present position. There are to be cuts

in capital expenditure to secure "a substantial total contribution" from the development of the fuel and power industries—the vital supply industries to manufacturers in every producing field There is to be a £35 million cut in the housing programme and tighter control of building. Estimates of the Government departments will be pruned, not "axed," and nowhere is there a bold, sharp incision of the major operation which is so clearly necessary. The saving of £2 million on the Ministry of Food is indicative of the timid character of this approach to the vital problem of cutting our coat according to our cloth. The last economy is to be derived mainly by reorganisation and dropping some "refinements of control." The fact has again been evaded that most of the controls themselves should go and with them the wasteful and costly bulk buying machinery, which every day adds to the national burden and frustrates initiative and enterprise in industry.

Nuclear Physics for All

THE realisation by the sponsors of a commercial enterprise that some knowledge of the scientific background and of the future of atomic energy is a legitimate concern of "the man in the street"—in this instance, the man and woman in the cinema—shows enterprise and vision. "Atomic Physics" is not exactly a new film; it has been shown to specialist audiences and has received an award at the Venice festival. Gaumont British Instructional, Ltd., which is the maker of the film, last week exhibited it at a West End cinema, where it continued its run this week. Marked interest has been shown by the general public which, in quite surprisingly large numbers, has paid to see an 85-minute film, the argument of which is by no means easy for the lay mind to grasp. "Atomic Physics" is the only film to date which has seriously tackled the problem of telling ordinary people something of the principles of that dramatic excursion in physics which may possibly intimately affect their future. The good work of the commentator, assisted by excellent animated diagrams, is largely responsible for the success of a film, which, though endowed with little entertainment value in the cinematic scale of values, is the very reverse of dull. Other producers of scientific films might do well to note the value of GBI's achievement and ask themselves if something of the same kind on their part would be of credit to their industry.

RUSSIAN TRANSLATIONS

SINCE September 1947, the use of Western European languages in periodicals has ceased in Russia. Prior to that time the lists of contents in many periodicals were translated into English, French and German, while some of the periodicals, such as *The Journal of Physics*, were published entirely in Western European languages.

DSIR Scheme

In attempts to make known the contents of Russian periodicals, many organisations have been translating contents lists for their own internal use. Recently the Department of Scientific and Industrial Research started a scheme for collecting these lists and publishing them at monthly intervals under the title of "Translated Contents of Russian Periodicals." The first issue appeared in June 1949. The original typescripts received from co-operators are used to make rota-print plates photographically.

Agriculture Medicine

About 100 Russian scientific and technical periodicals are available for export to this country and the DSIR publication covers some 70 of these in all fields, including agriculture and medicine. Copies of the "Translated Contents Lists of Russian Periodicals" are circulated free of charge to all co-operating organisations and, as far as the supply will permit, to other research organisations. If the demand becomes much greater it may be necessary to charge for copies.

A list of the periodicals not at present covered by the scheme is available and anyone interested in helping to make this publication complete is invited to write to the secretary, DSIR (Intelligence 1), Dorland House, 14-16, Regent Street, London, S.W.1.

RESISTANCE TO ALKALI WORKS ORDER

Carbon Black Makers Foresee Difficulties

FORCIBLE opposition was expressed, at a public inquiry in London last week, to official proposals to extend some of the provisions of the Alkali, etc., Works Orders. Resistance to the draft orders which the Minister of Health proposes to make under the Public Health (Smoke Abatement) Act, 1926, came principally from lamp black interests and a representative of one of the new carbon black undertakings, both of whom complained that there had been no adequate prior consultation and there were serious objections to making public the particular processes employed in the black plants.

Mr. W. A. Damon (Chief Alkali Inspector) held the inquiry, at the Ministry of Health on October 18, into the proposed extension of the effect of the Act and Orders to comprise, under "Sulphuric Acid Works," processes using oxides of nitrogen; under "Chemical Manure Works" granulating processes; under "Bisulphite Works" the evolution of oxides of sulphur in any chemical process; and under "Cement Production Works" the packing of cement and the grinding of cement clinker.

On the proposal to place "Fluorine Works" within the scope of the Alkali, etc., Works Regulation Act, Mr. Damon said the Act would cover the manufacture or use of fluorine compounds, which seemed fairly likely to be widely used in the near future. Replying to Dr. R. Lessing, he confirmed that the emission of traces of fluorine from registered cement works or fertiliser works would be within the new scope.

Exclusion of Black Works

Discussion centred principally upon the proposal to extend the effect of the Act to "Black Production Works" (the manufacture of carbonaceous blacks by the cracking or incomplete combustion of hydrocarbons, coal tar, petroleum or their derivatives).

Colonel R. H. Studholme (director of Philblack, Ltd.), asked that the black production works should be excluded from the proposed extensions. Pointing to the fact that the Minister could extend the Act, but not restrict it, he asked if that meant that any extension must remain for all time. Mr. Damon said he believed that was so.

Another point he raised was that Section 4 of the Public Health (Smoke Abatement) Act, 1926, provided that the Minister could make an order only after consultation with the local authorities and interests concerned. The manufacturers of carbon black in this country were only just getting down to work and had no trade association. His firm, probably the biggest of all, had not been consulted. He questioned whether the order could be made without previous consultation with the manufacturers concerned.

No Representation

Mr. Damon agreed that they had no association and that there was no means of contacting the manufacturers as a whole. But the Ministry, he said, had contacted the Association of British Chemical Manufacturers and the Federation of British Industries, and had had some communication with the South Western Gas Board and with one of the companies. Some of the people concerned, at all events, had been consulted.

Colonel Studholme asked that before any final decision was taken, there should be consultation with his company. He submitted that the paragraph in the draft order which would extend the Alkali Act to black production works should be deleted, or that it should be limited to lamp black works as distinct from carbon black.

His company, he said, had been licensed by a well-established company in America to make here a particular type of carbon black by a secret process evolved in America. The company was in the midst of constructing its works here. The works would cost approximately £1 million, and would be used purely for making carbon black by that process. A good deal of that particular black was used in this country and the whole of that was imported from the United States.

A covenant had been signed to provide that the process should be kept secret, and if particulars were disclosed, the licensors could terminate the licence. If the proposal in the draft order became law, the inspectors might require information which the company had undertaken should be secret.

The company here had asked in the U.S.A. about the effect of the process on the health of the workers, and, rather to its surprise, was told that the American

company, having watched the matter over a considerable number of years, could find no trace of danger to health. The workers there, continuously in the atmosphere of carbon black, used one cake of soap per man per day, and were allowed half-an-hour's washing time when they stopped work. It was material from the public health point of view that even under those conditions there had been no injury to health.

Full Safeguards

At the English works, an extremely expensive and complicated plant had been designed to filter the off gases and prevent black being discharged into the atmosphere. There were other precautions to keep wind out of the packing sheds, and to make everything leak-proof. They were advised that it would not be possible to redesign the filtering plant if new requirements were placed upon the company with the aim of preventing nuisance. They were also told that the present arrangements would meet the existing liabilities; they would meet the covenant of the landlords (the Bristol Corporation) against committing nuisance. Again, it was provided by the Public Health (Smoke Abatement) Act, 1926, that, even if the works were not covered by the Alkali Act, the Minister of Health could send an alkali inspector and could take action on his report.

The position at the moment was that the design of the plant was finalised, much of the material had been built to that design and the company was prepared to meet its obligations to the local authority and under the Public Health and Alkali Acts. He asked that the Minister should accept those obligations as being sufficient. He was not objecting to registration *per se*, but he was opposed to provisions which would enable an inspector to require the company to make known what it had promised not to disclose.

The make up of the off gases from the process was as follows:—

Carbon dioxide	3	per cent by volume
Carbon monoxide	8	,, ,,
Hydrogen	9	,, ,,
Nitrogen	43	,, ,,
Water vapour	37	,, ,,
Carbon black	Trace	

He submitted that there was nothing in those off gases which could be injurious to health, except carbon monoxide, and that would not be injurious when discharged from the top of a chimney in small concentrations. Asked by Mr. Damon whether he could define "a slight trace" of carbon black, he said it was not expected to exceed .01 gr. per cu. ft. and it might be substantially less.

Commenting on the circumstance that once an extension of the Act was made it could not be unmade, Colonel Studholme submitted very strongly that until there was evidence of the need for bringing that new industry under the Alkali Act, the Minister should be asked to hold his hand; he would be taking an irrevocable step.

He gathered that it was desired to apply the Act to lamp black and in that connection he asked that complaints against one type of production should not be used as a reason to put another type permanently in the order.

Mr. McKay (representing Wood & Fairweather, which has been manufacturing carbon black and lamp black for 150 years), also made the point that the local authority concerned in his case had had no notice of the inquiry and had not been consulted. If the inquiry were conducted according to the strict letter of the law, the local authorities could say that they must be consulted. His firm's process, he observed, was also secret and they did not wish it to be divulged.

Speaking of the health of the workers, he referred to a list relating to employees who had been working for the company for long periods; four had been working there for more than 40 years, two for more than 30 years, and so on. The work had not affected their health.

Gasworks Problem

Mr. Palmer, for the North Thames Gas Board, submitted that the production of retort carbon within the retort in gas manufacture came within the definition of "works in which carbonaceous blacks are manufactured," although he assumed it was not the intention.

Mr. Damon could not confirm that that was so; he said that point was being considered.

At the conclusion of the inquiry, Mr. Damon said the observations concerning black production works would be conveyed to the Minister and there would be consultations with the carbon black and lamp black manufacturers.

Safety Measures in Factories

A Scottish conference on industrial accidents is to be held in Edinburgh on December 8, under the chairmanship of Sir Andrew Murray, the Lord Provost. The programme of the conference will cover the three main ways of averting accidents—guarding machinery, efficient safety organisation, and propaganda.

SEPTEMBER'S CHEMICAL EXPORTS

Slightly Less Than in 1948

ALTHOUGH British chemical exports were lower in September than in the same month last year, they represented a slight increase over the August figures.

The total value of exports for the month shown in the *Trade and Navigation Accounts of the United Kingdom* for September 1949, was £6,994,535 (£7,519,213), made up as follows: chemical manufactures and products (other than drugs and medicines) £3,455,547 (£4,328,699); drugs and medicines £1,565,692 (£1,382,700); dyes and dyestuffs £970,660 (£761,304); paints and pigments £1,002,636 (£1,046,510).

In the first nine months of this year exports totalled £64,546,670, an increase of £2,344,969 over the same period of 1948.

Representative totals are as follows:—

CHEMICAL EXPORTS

	Sept. 1949	Sept. 1948
	Cwt.	Cwt.
Formic acid	1,131	3,286
	lb.	lb.
Salicylic acid and salicylates	373,315	254,382
Value of all other sorts of acid	£97,015	£90,776
	Tons	Tons
Aluminium oxide	17	125
Sulphate of alumina	2,397	2,304
All other sorts of aluminium compounds	610	445
Ammonium sulphate	15,677	33,057
Ammonium nitrate	2,221	6,538
All other sorts of ammonium compounds	1,775	1,957
Bleaching powder	12,430	60,076
	Cwt.	Cwt.
All other bleaching materials	12,427	17,707
	Gal	Gal.
Cresylic acid	112,206	168,020
Tar oil, creosote oil, anthracene oil, etc.	2,854,128	2,810,660
Value of all other sorts of tar oil	£55,104	£40,659
	Cwt.	Cwt.
Collodion cotton	1,378	1,283
	Tons	Tons
Copper sulphate	1,381	435
	Cwt.	Cwt.
Disinfectants, insecticides, etc.	37,090	62,706
	Tons	Tons
Fertilisers	1,016	1,239
	Cwt.	Cwt.
Nickel salts	3,625	5,350
Lead acetate, litharge, red lead, etc.	7,193	8,223
	Gal.	Gal.
Tetra-ethyl lead	154,260	50,656
	Tons	Tons
Magnesium compounds	801	797
	Gal.	Gal.
Methyl alcohol	6,294	13,404
	Cwt.	Cwt.
Potassium compounds	4,352	11,367
	Tons	Tons
Salt	18,456	21,316
	Cwt.	Cwt.
Sodium carbonate	278,527	334,828
Caustic soda	206,406	258,370
Sodium silicate	40,095	23,920
Sodium sulphate	30,667	16,089
All other sodium compounds	70,970	89,173
Cream of tartar	609	92
Tin oxide	320	359
	Tons	Tons
Zinc oxide	1,147	1,768
Value of chemical manufactures, excluding drugs and dyestuffs	£3,455,547	£4,328,699
	Oz.	Oz.
Quinine and quinine salts	215,251	192,206
	Lb.	Lb.
Acetyl-salicylic acid	165,190	118,051
	100 International Units	100 International Units
Insulin	784,704	753,192
	Mega Units	Mega Units
Penicillin	848,451	323,340
Total value of drugs, medicines and preparations	£1,565,692	£1,382,700
Total value of dyes and dyestuffs	£970,660	£761,304
	Cwt.	Cwt.
Plastic materials	40,218	33,654
Value	£445,064	£431,731
	Cwt.	Cwt.
Chemical glassware	1,318	1,279
Value	£50,901	£45,513
	Cwt.	Tons
Fans	4,984	232
Value	£145,196	£113,626
	Cwt.	Tons
Furnace plant	5,981	258
Value	£70,183	£58,664
	Cwt.	Tons
Gas and chemical machinery	19,375	690
Value	£284,272	£180,102

CHEMICAL IMPORTS

	Sept. 1949	Sept. 1948
	Cwt.	Cwt.
Acetic anhydride	11,055	5,431
Acetone	—	6,763
Acetic acid	—	15,851
Boric acid	3,420	4,930
All other sorts of acid	2,360	3,216
Borax	1,000	22,950
Calcium carbide	1	31,535
Coal tar products (excluding benzol and cresylic acid)	—	10,442
Cobalt oxides	614	603
	Tons	Tons
Arsenic	975	570
Fertilisers	—	390
	Lb.	Lb.
Glycol ethers and glycol ether-esters	1,016,817	459,837
Iodine	151,391	—
	Cwt.	Cwt.
Potassium chloride	675,058	801,136
Potassium sulphate	33,398	8,576
All other potassium compounds	2,666	5,371
Sodium nitrate	60,000	69,790
All other sodium compounds	6,544	6,777
	Tons	Tons
Sulphur	69,614	77,340
	Cwt.	Cwt.
Carbon blacks (from natural gas)	44,160	106,567
Total value of chemicals, drugs, dyes and colours	£1,905,849	£2,613,585

LABORATORY PROCESS PLANT IN GLASS

Widening Usefulness of Shock-Resisting Assemblies

A WARTIME development of the use by chemical and other industries of plant and equipment made entirely of glass components, occasioned principally by lack of the customary materials, has become an established practice and promises to extend to a widening field of chemical activity. Some conspicuous advantages of glass surfaces and often a saving in capital cost combine to hasten the acceptance of that policy.

The ready availability in glass of many familiar items of factory and laboratory equipment and apparatus is also playing an important part in this extension of the chemical uses of glass. This is made possible by the specialisation and standardisation by such firms as Quickfit & Quartz, Ltd. (a subsidiary of the Triplex Safety Glass Co., Ltd.), whose factory at Stone, Staffs.—started in August 1946—we were enabled to visit this week.

In the enterprise, the company has been encouraged by numerous recent examples of the acceptance by chemical industry of glass equipment on its own merits. A typical case was a chlorination plant where 20 large lead condensers were replaced by glass condensers and the change was stated to have effected a saving of £2000 a month in maintenance costs and a fourfold increase in production.

In a wartime nitric acid plant, stainless steel condensers in use in three departments were found to have an average life of only three weeks each. Production was curtailed by the inability to run the sectional plants separately, and finally the problem of obtaining stainless steel became acute. One glass condenser was supplied which, when the war ended, had been in use continually for 12 months, and the one plant had, in fact, supplanted the original three.

Seen in process of fabrication at Stone were numerous examples of laboratory glassware with interchangeable conical ground-glass joints, produced from glass tubing and flask mouldings. The cones and socket blanks are preformed on lengths of tubing or on flasks, and are annealed before the grinding operations which produce the final accurate taper for ensuring gas- and liquid-tight seals.

After a final inspection, the finished interchangeable joints are either sent to the stores for direct sale or re-issued to the lampworkers for assembly into the

Edge-grinding larger heat-resistant vessels in a flat mill. Above, left: Grinding the shaped neck of a flask to provide a gas-tight joint

various units of scientific plant being made. Thorough inspection is carried out at all stages—of the ground-glass joints for accurate size and fit, of blown-ware primarily for conformity to standard, for general appearance, freedom from strain and pin holes.

Large Glass Condensers

The glass condensers made at the Stone factory are claimed to be the first of their kind in glass in plant scale. In these, the special cooling-coil assembly uses the available space to the full. High velocity of coolant through the coil ensures the minimum thickness of stationary film.

Smoothness of surface finish is also an important factor contributing to this and, it was pointed out by the Quickfit experts, to the superiority of glass over metals for certain purposes. Metals, it is recognised, score over glass in thermal conductivity, but metal tubes in condensers are seldom found to be smooth, and, in fact, hold a considerable film of stationary liquid or gas, and provide a good foundation for growth of scale. In glass, it has been found that there is little tendency for scale or deposition to develop and, if formed, they are readily visible, so that steps can be taken for cleaning.

A practical example of the resistance to thermal shock concerns the use of a 15 sq. ft. glass condenser situated at the top of a still. While distilling acetic acid, the still caught fire at the base. Flames passed both around the outside and through the centre in contact with the cooling coil still circulating cold water, until the rubber feed tubes were burnt away from the water connections. After the flames were extinguished, the glass condenser was found to be intact and was put into service again.

Glass stills are now available in sizes of use to commercial production. Batch stills having vessels of 10, 20 and 50 gallons capacity are available with a range of fractionating columns, stillheads and condensers. Continuous stills employ steam-heated vessels and standard column sections with small feed sections which can be built up into the appropriate lengths for stripping and rectifying.

Glass chemical plant is manufactured to withstand widely differing conditions of service, including high pressures and temperatures, vibration, and chemical action. The normal maximum working pressure of gas plant up to 3 in. diameter is stated to be 100 p.s.i.; 4 in. diameter, 60 p.s.i.; 6 in. diameter, 50 p.s.i.; 9 in. diameter, 20 p.s.i.; 12 in. diameter, 10 p.s.i. Higher pressures can be worked for special re-

(*continued at foot of next page*)

Supplementing the supply of standardized pieces, much specialised apparatus is required the production of which, from blue prints, is shown here. Left: fitting specialised parts to a standard piece; right: this piece is made by hand throughout to satisfy particular requirements

C

COPPER SULPHATE SALES

Big Improvement in Exports

A GRATIFYING measure of recovery in the export markets was recorded by Mr. J. D. McKechnie, presiding at the 25th annual meeting in London last week of the British Sulphate of Copper Association. He noted with satisfaction that the previous season's poor export result had been exceeded by about 10,000 tons. Last season's total was 34,810 tons, compared with 24,236 tons in 1947-48.

Restrictions

"These better results," he said, "were not obtained easily; on the contrary, there were many difficulties connected with import restrictions and shortage of sterling in certain countries to be overcome. As in previous seasons, we have worked in close co-operation with the Board of Trade, and we have received every assistance from them, and also from the British Embassies in our export markets.

"The outlook for the 1949/50 season is promising and, provided there are no payment difficulties due to shortage of currency, the association expects to be able to increase its exports over last season's.

"Following the devaluation of the £ sterling, the U.K. price of copper was raised, and the members were obliged to increase the price of sulphate of copper to cover the higher cost of raw materials. It is too early yet to say how this increase in our costs will affect our competitive position in European markets.

Fluctuating Metal Price

"The manufacture of sulphate of copper at a stable price during the past season has not been facilitated by the constant fluctuations in the price of copper and, unfortunately, there is no Metal Exchange to enable us to cover sales. Stability of sulphate of copper prices is desirable for the promotion of sales, but this is virtually impossible under present conditions pertaining to copper.

"There have also been further increases in wages during the past year, and more wage claims are said to be in the offing. It should be emphasised that continued increases in costs will sooner or later result in our not being able to meet foreign competition in our export markets; and it must not be forgotten that, before the war, foreign makers were in a position to produce at lower cost than we were, and that this state of affairs may well arise again if the demand for higher wages persists."

RIC IN SCOTLAND

Formation of New Section

A NEW section of the Royal Institute of Chemistry has been formed in Dundee to serve that city, and the counties of Angus, Perth and Fife. Chemists in the oil, plastics, textile, food and engineering industries are included in the new section as well as a number of groups from colleges and schools.

Dr. Robert Roger, lecturer in chemistry, University College, Dundee, took the chair at the initial meeting. Mr. Andrew Dargie, public analyst, outlined the development of the institute's membership in the county and the decision to establish a separate branch.

Officials appointed were Mr. Andrew Dargie as chairman and Dr. Robert Roger, vice chairman. The hon. secretary and treasurer is Mr. W. Stewart Liddle, Dundee. The committee comprises Messrs. Alexander Hood (Bell-Baxter School, Cupar), Douglas M. G. Lloyd (The University, St. Andrews), George F. P. Parsons, Herbert L. Parsons, and Henry A. Watson. The hon. auditor is Mr. N. B. B. Johnstone (Technical College).

LABORATORY PLANT IN GLASS

(continued from previous page)

quirements by arrangement with the manufacturer.

The maximum working temperature can be considered as 300° C. For temperatures above 150° C., however, precautions should be taken to prevent excessive thermal shock such as chilling with rain or snow. Glass pipe-lines are claimed to withstand all normal pump and machinery vibrations, provided when connecting these to vibrating machinery rigid support is not made within approximately 10 ft. of the vibrating equipment.

Glass is suitable for use with all acids with the exceptions of hydrofluoric and hot concentrated phosphoric acids. It may be used successfully with dilute alkalis, but is attacked by hot strong caustic solutions.

Quickfit & Quartz, Ltd., is exporting examples of its glass equipment in a modest way to the U.S.A. Total exports to all countries are in the neighbourhood of 40 per cent of production. Overseas customers include Australia, New Zealand, India, South Africa, Scandinavia, Belgium, Holland, Switzerland and Egypt. Recently a record individual shipment of some £6000 worth of laboratory glassware was sent to Australia, and three months ago the company sent a piece of glass apparatus to Canada for the first time.

MANUFACTURE OF VERY TOXIC CHEMICALS

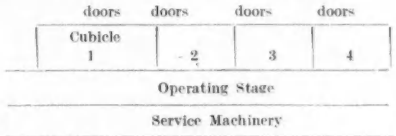
*Plant Layout and Workers' Welfare**

by S. B. CORMACK, M.A., D.Sc., Ph.D., F.R.I.C.

IN both these examples (of contamination of electric motors by toxic vapours) a complicated electrical instrument was used, but the connection between the toxic area and the instrument was only two wires. All the complications were non-toxic. In the first case, the only toxic portions were two insulated wire coils outside a glass tube, and in the second a very robust microphone and a small air jet which could be removed and replaced in a matter of minutes.

When a ship is designed it is usual practice to make a scale model. This is sometimes practicable for chemical plant, and I think it is most valuable for toxic plants. It is of use to the design engineers, even though they claim to be able to assimilate all the details from the drawing board; it is of use to chemists who do not always claim such omniscience, and it is certainly of great value to all the labour and medical authorities who are so deeply involved in the detailed organisation of the plant. Finally, it is of great assistance in teaching the process worker.

The usual design of building is to have a series of cubicles or large scale fume cupboards to house units of plant. These cubicles are glass fronted, and all controls are operated from outside the cubicle, or by opening a slide window and putting a hand just inside. A typical layout is illustrated in the following diagram:—



The plant is inside the cubicles 1, 2, 3, 4, and the sides towards the operating stage are Triplex glass fronted. All controls are reached from the operating stage. Access to the cubicles is only gained through the doors opening at the back, and the key to these doors can only be issued on the instructions of a senior official. It is usual to tile the walls or use a high gloss paint so that they can be washed down easily, and the corners are rounded for the same purpose and to reduce dust collection. On the other side of the operating stage is the building which houses service machinery such as air compressors, to give a compressed air supply for operating controls, vacuum pumps, pumps for non-toxic intermediates and so on. Any machines which may be potentially toxic are set apart and ventilated if necessary.

Building Design

In the design of the building one should not forget that cleanliness is important, and washing down will be frequent. It is essential that all floors drain, and drain quickly. Very few do. There seems to be an inherent objection among many civil engineers to floors which have sufficient "fall" to drain properly.

One of the major items in the building design is, naturally, the ventilation arrangements. I have already outlined the cubicle system with the operating stage in front. Of course, the basis of all the ventilation schemes is to extract potentially contaminated air from the cubicle. This can only be efficiently done by independent trunking to the top of each cubicle, although the individual connections may, of course, join a main duct outside. The distribution of the suction to each cubicle should be controlled by the size of ducting and not be dependent on any valve arrangement.

It is better to take the foul air from the top, even if the vapours are heavier than air, because convection currents due to heat from the plant generally far surpass any effect due to vapour density. The fresh air to replace the offtake is again best admitted by an independent duct to the outside atmosphere and not from the operating stage, for which independent arrangements should be made.

The degree of ventilation depends on the nature of the substance handled, but the general tendency is to make sure that the cubicle is swept through with fresh air as frequently as possible, and air flows which correspond to a rate of change of air in the cubicle of 40, 60 or 120 times

* Conclusion of abstract from the paper presented before the North Western branch of the Institution of Chemical Engineers in Manchester on October 8, commenced in last issue, pp. 568-570.

per hour are not uncommon. For the operating stages changes of 15 to 20 an hour are more usual.

Ventilation to this degree is expensive. Large capacity fans are required to move these large volumes of air, which in cold weather must be heated, particularly for the building section where plant will be working. As an example of the scale of these arrangements, I may mention one large installation to ventilate buildings in which very toxic material was handled and in which the two main fans each moved 234,000 cu. ft. of air per min. and were driven by motors of 275 h.p. The steam consumption for heating the air alone varied from five to ten tons an hour.

Ventilation Tests

Whatever ventilation system is decided upon, it is most important to test it at an early stage so that it can be modified if necessary. The test in which I, personally, have most faith is to let off a smoke generator inside the cubicle and allow the whole cubicle to become filled with smoke, then switch on the ventilation, open all the access points if there are any, and see what happens. If any smoke comes out into the operating stage or where men may be working, the ventilation is inadequate. It is no use people saying that the test is too drastic. The toxic material which is to be manufactured will be drastic enough if it gets a chance.

Nor are the problems of ventilation solved when we have achieved an adequate flow of air in the cubicle and when the test has been found to be satisfactory. What happens to the exit air? One method, adopted perhaps more in America and Germany than here, is to pass all the fumes into a very tall chimney so that they are discharged clear of any buildings, and sufficiently high in the air so that even if, under certain atmospheric conditions, they tend to come down, they will be so dilute as to be innocuous. This solution is no longer favoured in this country, and is becoming less favoured abroad. And rightly so.

Every effort should be made to destroy the toxic constituents before they are discharged to the atmosphere, and the plant design cannot be considered complete until this is done. The methods adopted depend on the nature of the material handled. It may be possible to use a packed tower, or a proprietary type of air washer, or passage through the boiler plant flues, if the material is destroyed by heat and does not give acid decomposition products.

From the treatment of gaseous effluents, we turn to the treatment of solid and liquid effluents. We all know how these are apt to get overlooked in the laboratory stage. More and more I have realised the full meaning of the remarks of my university chief, Prof. G. G. Henderson, who gave me this advice when I left him to go into industrial work, "Well, my boy, don't forget, in industry you won't be able to pour your residues down the sink." Our ancestors solved this problem by dumping solid refuse around the factory and pouring the liquids into the nearest stream, and so we have unsightly waste heaps around our works and less fish in our streams. These things are not accepted nowadays with normal refuse, still less so with toxic effluents.

All residues must therefore be collected in a treatment system where they can be detoxified before disposal. The usual method is to provide a pit which is capable of holding the normal flow of materials for a sufficient time to allow decontamination to be complete, and to provide also for breakdown conditions on the plant. This means that the pit should be large enough to take the contents of one of the largest plant vessels in case of an unexpected failure of that vessel. All effluents and all drainage from toxic areas must run to that pit. If the final discharge is to tidal waters it may also be necessary to arrange for sufficient capacity to be installed for the pit to be discharged only on the outgoing tide.

Distant Controls

If we could construct the plant satisfactorily inside cubicles with distant controls so that no one need go near the plant items and if the ventilation arrangements were perfect, there would be no reason for the plant operators to wear any special clothing or take any particular precautions. With the resources at our disposal and the development of measuring instruments and controls, the ideal is becoming more attainable. But, since in dealing with highly toxic materials the consequences of a mishap are so serious, because, in short, the penalty for a little inattention on the part of an operator may be serious disablement or loss of life, it is necessary to have what might be called a second line of defence.

This second line of defence is the provision of protective clothing. Even after this there is a third line of defence—the first aid and medical arrangements. If the plant equipment fails, if the protective clothing fails, if first aid is insufficient, there is still left the resources of the fac-

tory medical station and, if necessary, all the skilled attention and specialised equipment of the hospitals.

All these arrangements revolve round the labour, welfare and safety organisation. This covers a very wide field, and there can be no attempt to deal with it adequately at this time. But all those who have had experience of factory management know how much time these affairs can take up, even in normal factories—what *The Economist* has described as "the fearful pre-occupation with lavatories, washbasins and lockers for clothing." In factories dealing with toxic material this "fearful pre-occupation" can rise to tremendous heights, and it is not uncommon to find that the whole of factory activities revolve round the change rooms.

In dealing with the repairs to a joint on a toxic pipe line, we had a hint of the elaborate organisation necessary to provide everyone with adequate protective clothing, and we shall leave it at that. Similarly, we shall just remind ourselves that an extensive medical organisation must be established, but let us also remember that the function of a proper medical department is not simply to treat casualties, but to promote safe and efficient operation of the factory by assisting in accident prevention and the control of toxic hazards.

The medical department must also provide the first aid instructions to deal with personal contamination. These instructions must be simple, easy to remember and easy to follow. When the need arises, people are not likely to be able to remember, still less to carry out, anything but the simplest instructions.

Operating Instructions

When we have designed and built the plant, when we have made arrangements for the protective clothing and safety devices and the enormous organisation behind them, we have still something else to have ready before we start to employ any labour on production. We must have detailed operating instructions for all sections of the plant, and these should cover, as a matter of routine, the action to be taken in the event of plant breakdowns, failure of electric power and similar occurrences. It is no use the staff saying it cannot be done. It can be done! And it must be done!

In addition to giving full instructions to the people involved, these instructions are a most valuable aid for accident inquiries, and the preparation of them means that the members of staff concerned must study the plant in complete detail.

We are now ready to engage the men. What do we tell them, and how do we train them? First of all, what we tell them should be agreed, and all members of the production staff as well as the labour, welfare and medical departments should all say the same things about the precautions taken to avoid injury, the first aid treatment and the effects if anything does go wrong. It must be emphasised that the risk is negligible because of the design of plant and that, in fact, conditions are better and safer than in many normal plants.

If the members of the staff do not honestly feel that they can say this, then they should go back and redesign the plant until they can say so. The attitude towards the wearing of protective clothing and bathing and changing should be that it goes with the job. The money is paid for doing these things as well as for operating the plant. The use of the term "danger money" is to be deprecated.

Staff Training

When the initial selections have been made and the men are ready to start work, they should be given a short training course. During this course a series of talks is given by the staff operating the plant. This not only tells the men about the job, but lets them see that the members of the staff are fully familiar with the work and enables everybody to get to know one another.

During this preliminary training the men should be given every opportunity to become familiar with the plant controls and general layout. When we are satisfied that they are reasonably competent, arrangements can at last be made to start operation. But even yet we must not hurry. We must run the plant on some relatively innocuous material resembling the final product until everybody is completely familiar with what happens, and above all until all the plant items have been thoroughly tested under conditions as near to production conditions as we can arrange.

In one case where we had to use a chlorinated solvent in the process, we ran the plant on the solvent for three weeks until every man was fully familiar with all the controls he had to operate. These "mock runs" must be taken as seriously as a dress rehearsal, and full precautions must be observed, including the wearing of protective clothing, and every spill must be regarded as toxic.

Finally, the plant is made "toxic" by starting production of the material for which it has been designed. If we make

(*continued overleaf*)

A New Fluorine Compound

Industrial Adaptability of Sodium Trifluoroacetate

SODIUM trifluoroacetate, CF_3COONa, is a new fluorine compound available in pilot plant quantities in the U.S.A. for appraisal by the chemical industry. It is a white, odourless, non-corrosive and free-flowing powder. Unlike the monofluoroacetates which are extremely toxic, and difluoroacetates which are moderately so, this salt is non-toxic. Sodium trifluoracetate is very stable up to 300° C., when decomposition takes place with the formation of carbon dioxide, carbon monoxide, trifluoroacetyl fluoride and trifluoroacetic anhydride. The new salt is resistant to hydrolysis and is not attacked by aqueous alkali at the boiling point.

The commercial grade of sodium trifluoroacetate usually has a purity of 98-99 per cent, the most common impurities being sodium chloride, carbonate and sulphate, and traces of moisture. The salt is freely soluble in water at room temperatures, fairly soluble in ethyl and methyl alcohols and also methyl ethyl ketone, slightly soluble in ether, but insoluble in benzene, carbon tetrachloride and perchloroethylene.

The physical and chemical properties of sodium fluoroacetate suggest its use as an intermediate in the preparation of herbicides, insecticides and dyestuffs, and as a condensing agent. Prominent among its reactions is its conversion to ethyl trifluoroacetate by treatment with ethyl alcohol and sulphuric acid. This ester can then be reacted with ammonia to form trifluoroacetamide, which may be changed into the nitrile by the action of phosphorous pentoxide.

The chief value of sodium trifluoroacetate lies in its readiness of conversion to trifluoroacetic acid, which is the starting off point for a number of important reactions. This acid is as highly ionised as hydrochloric acid. It fumes in moist air, and its azeotrope with water boils at 105.5° C. and contains 79.4 per cent trifluoroacetic acid. The acid is highly reactive, and when treated with phosphorous pentoxide it changes into trifluoroacetic anhydride which on hydrogenation will give trifluoroethanol. Benzoyl chloride reacts with trifluoroacetic acid to form trifluoroacetyl chloride.

Vinyl trifluoroacetate can be produced when the acid is allowed to come in contact with acetylene, and in the presence of catalysts the trifluoroacetate is changed into the polymer.

MANUFACTURE OF VERY TOXIC CHEMICALS

(*continued from previous page*)

any mistake now, we must pay the penalty. There is, however, just the chance that something has been overlooked and that there is a very slight escape of toxic material into some place where people are working. We should, therefore, put particular emphasis on tests of the plant atmosphere until we are satisfied that no danger exists. If some type of continuous recording instrument can be devised, then we are fortunate indeed.

I know of one plant manufacturing very toxic materials for which a very sensitive analytical test had been devised. This was employed in continuous recording instruments all over the plant. An immediate alarm was given for a dangerous concentration, and all the charts were sent each day to the medical department. This department was given full authority to have any section shut down if the charts indicated that conditions had become abnormal—even without being dangerous. It was interesting that the first warning of irregularities in plant operation often came from the medical department!

It is not always possible to achieve such a desirable result as to have a continuously recording analytical instrument. On another plant we found that the most sensitive detector was the human nose. People used to laugh at this, but it was a fact that the trained nose could warn of an increasing concentration which was later revealed by analytical tests. We did not, in fact, employ people in that particular plant if their sense of smell was deficient.

On phosgene we allow people to smoke. The taste of a cigarette in even a minute concentration of phosgene is quite sufficient to make the process man do something about it, and quickly too.

So we have come to the stage at which we are operating the plant on toxic material, and if all our work has been right we should continue to operate it efficiently and safely.

NEW PLASTIC FOR CHEMICAL INDUSTRY?

Possible Advance on PTFE

From A CORRESPONDENT

A POLYMER of trifluorochloroethylene now produced commercially in the U.S.A., appears to offer important advantages over polytetrafluoroethylene (THE CHEMICAL AGE, *60*, 10-14) as a material for fabricating parts of chemical plant, such as valve seats, valve packings, pump packings and diaphragms, chemical pipe, tubing and gaskets; as protective coatings on chemical processing equipment and containers, and as collapsible bags for the storage of liquid fuels, including fuming nitric acid.

Like PTFE, the new polymer has a high resistance to chemical attack. No effect has been observed after prolonged exposure to concentrated sulphuric, hydrofluoric and hydrochloric acids, to strong caustic, to fuming nitric acid, aqua regia and other vigorous oxidising agents. It is equally resistant to most organic solvents but is slightly swelled and plasticised by highly halogenated materials and some aromatics.

The plastic is currently supplied in three different grades representing three different molecular weights. Average density is 2.1; Rockwell hardness (R scale) 111-115; impact strength (Izod notched 77° F., 3.62 ft. lb./in. notch. tensile strength 5730 p.s.i. at 77° F.; flexual strength 8260 p.s.i. (77° F.) and compressive strength 32-87, 600 p.s.i. (77° F.). The thermal coefficient of linear expansion—80° to 20°C.—is 4.5×10^{-5} in/in/°C. and from 20°C. to 150°C. 7×10^{-5} in/in/°C. Thermal conductivity is 1.44×10^{-4} cal/cm²/°C./cm. and specific heat 0.216/grm.

Commercial Application

The obvious performance advantages of this fluorine thermoplastic inherent in its unique chemical and mechanical properties can be realised in commercial application only through carefully controlled moulding. It has been shown by extensive experimental work that this plastic can be moulded by compression, injection, transfer and extrusion methods with conventional equipment. In addition, the plastic can be machined easily and the head sealed.

Unlike PTFE, the plastic is remarkably amenable to heat treatment; thus it may be made relatively soft and resilient, resembling a plasticised material, or harder and less yielding without expensive processing. A significant feature of such treatment is that no sacrifice of any of the stability characteristics is made.

Whereas PTFE is a dense and generally opaque material in massive form, the new fluorine polymer can be made transparent or translucent to visible light as desired. It is also sufficiently transparent to longer wave lengths for use as a window material in the infra-red region.

Transparency

Rapid cooling or quenching of the plastic moulded material through 400° to 300° F. temperature range produces both transparency and flexibility, proportionate to the rate of cooling. Complete quenching is possible only with relatively thin cross-sections, due to the insulating properties of the polymer. Thick cross-sections which are rapidly cooled vary internally in physical properties with distance from surface.

Quenched 1/16 in. sheet is almost perfectly transparent, while 1/8 in. sheet has a slight blue haze. This is due to light scattering by crystallites and is a condition that becomes progressively more apparent in thicker sections, from which transmitted light has a noticeably yellow or pink colour.

Generally speaking, some crystallisation is induced by the slow cooling of moulded polymer from the transition temperature, or by subsequent heat treatment of quenched material at temperatures approaching its transition temperature. The degree of crystallisation in the freshly moulded plastic is dependent on the rate of cooling.

Polymers of trifluorochloroethylene do not possess such outstanding resistance to heat as PTFE and as an average the temperature range is from −320° F. to 375° F. The inclusion of a chlorine atom in the polymer also makes it inferior to PTFE as an insulating material at very high frequencies.

So far it has found its main uses in the electrical industry as insulation and wire coating and condenser foil for applications under corrosive conditions at extended temperature ranges in motors, transformers, control instruments, etc.

PAPER AND TEXTILE FIBRES

Competitive Research Enriching Technology

By Dr. G. ULLMAN*

PAPER has now started, and continues with enormous speed, to invade the province of textiles, and it seems to be a most successful attacker, well supported by its cheapness.

Let us consider first of all the main points where textiles are losing ground, such as sacks, which were mainly constructed from jute. But in the U.S.A. and elsewhere this was largely replaced by paper. This was much more effective when it was found how to protect paper by impregnation against the influence of water, mould, insects, etc.

The effectiveness of the present cement bags is clearly seen and it is worth noting, among other things, that 60 per cent of America's domestic flour is packed in paper.

Artificial Fibres

If you consider the probably increasing need for fibres in the future and ask from what source they can be supplied for both pulp and textiles, you may agree with me that the soil will be unable to fill the gap. Man-made fibres will have to do that. The chemical pot is elastic, nature is not.

Some technical reasons may be added here. It is not so many years ago that it was regarded as impossible to produce suitable rayon pulp from something else than a particular kind of wood, especially soft wood. Since then, chemists have succeeded in using other starting materials for a satisfactory rayon pulp, using hardwood and also many types of agricultural wastes from annual crops which are available in every land and could enable practically all countries to become to a great extent independent of imported raw materials.

Paper insulating materials for the electrical industry have to some extent supplanted silk and cotton and the industry finds many uses for items made from paper which once were of textile material.

The technical relations between paper and textiles are numerous and I can list only a few of the many similarities in working methods. First of all, close relations exist between production of paper pulp bleached or unbleached, and the similar methods employed by the textile industry to boil and bleach vegetable fibres. New mechanical and chemical developments worked out by one trade are equally studied and used in the other. One has borrowed from the other for processes of impregnation for fire-proofing, insect-proofing, mould resistance, softening, stiffening, crease resistance and nearly every process one can mention.

Let me mention only the revolutionary trend in bleaching, which I think was started by the economical and therefore extensive use of peroxides, and which is now directed to chlorites and chlorine dioxide. Finishing, coating, filling, etc., of paper is similar in many ways to processes used for textiles. Both serve as bases for resin finishes for making leather-like fabrics, etc.

One could mention a number of similarities between pigmented papers and printed textiles and between dyeing applied to paper and to textiles. Perhaps paper-dyeing may be more closely linked with dyeing of loose cotton, slivers or yarns, because that is more akin to the common method of adding colouring matters to paper-pulp in the beater stage.

Textile Dyestuffs

The paper colourist has taken and adapted to his purpose many dyestuffs produced originally for textiles, although his range of types and processes is more limited. The textile dyer has more control through his range of working temperatures and possibilities of after treatment, etc.

It is of interest to note that silk screen printing has developed greatly in both paper and textile trades. One recent machine for this process was designed for textiles, but has now been adapted to wallpaper work.

The mechanical finishes are also very similar and, at least as far as calendering is concerned, paper is probably much more advanced. Increasing the water-proof qualities of both materials is a common target.

In this connection an interesting development is the use of metal-foil-surfaced

* Extracted from a paper "Some Relations, Economical and Technical, between the Pulp and Paper Trade and the Textile Trade," by Dr. G. Ullman, read by Dr. P. Bean before a meeting of the Society of Dyers and Colourists in Manchester on October 21.

paper as a heat insulation material, and we have seen its effective application in such places as constant temperature testing rooms.

One problem which is common to both industries is that of providing good and clean water for manufacturing purposes and, perhaps much more important, dealing with their effluents, a matter which becomes daily much more difficult. Both trades have also similar problems and processes in humidifying.

For many years my work has been divided between the textile and the pulp trades, and I have been fortunate in having the opportunity to develop various processes.

I had some success with a pretreatment of slivers, treating them for a few minutes only with a hydrochlorite solution at a temperature of about 40-50° C. in an alkaline medium.

As a textile man, I was always accustomed to pretreat the material by desizing before putting it into the digester, and I find it surprising that in pulping processes there is practically none where a pre-cleaning treatment is used comparable with desizing of textiles. This means that pulping processes tend to be done in one rather brutal operation.

It became clear that if some of the natural impurities of cotton were attacked by such an acid pretreatment, it would help remarkably the following alkaline boiling process. In these circumstances it is not astonishing that, when studying improvements in the pulping of straw, acid pretreatment of sized textile fabrics came to mind.

Separation Problems

Naturally, a material like straw, etc., is very different from cotton because the latter contains only, say, about 8 per cent of natural impurities and raw pulp-material like straw and many others of this kind have about 50 per cent. It was known that an acid pretreatment acts especially on the hemicellulose contained in such materials, which amounts to about 25-30 per cent of the weight of the raw material and this, mainly pentosans, is hydrolised to sugars, and in that way removed from the material.

Pentose sugars have many interesting uses, as a basis for production of such yeasts as *Torula utilis* and for production of furfural, or, furan products.

When we started these studies I came to a rather promising result, and we had no knowledge that processes based on the same principles had been developed during the war in Germany. But there the main and only target was rayon pulp, by processing pentosan-rich materials like hardwoods, cereal straw and, as we heard later, in the East, rice, etc.

In these cases the removal of all pentosans is the main target, regardless of the fact that the fibre is attacked and the chain length of the cellulose molecule shortened accordingly. We could not do this, because paper fibre has to keep its strength and other good physical properties. It was a most tiresome and difficult way to come to the results, whereby we can extract enough of the sugars with suitable economy and make the treated material much more suitable for a milder digestion and bleaching than normal, and achieve a satisfactory yield and shade.

Dr. Campbell, who was working in the Forest Products Department at Princes Risborough, has also worked and obtained patents on nitric acid pulping for manufacturing of fodder cellulose.

Acid Processes

We were, of course, fully aware of most essential differences between dissolving starch by an acid hydrolysis process in the one case, and in our case, treating row cellulosic materials, in which the fibres are embedded in a very large quantity of natural impurities, including mineral matter and larger amounts of hemicelluloses and lignins.

In all cases, textile or paper, it must be strongly emphasised that the fibre must have protection by its coating of impurities. This enables it to withstand a treatment which would have serious consequences on a cleaned and unprotected fibre.

The acid attacks mainly the hemicellulose and converts it to soluble sugars, mainly the pentose xylose, whereas hydrolysis of starch leads to the hexose-glucose.

According to the conditions of the acid pretreatment, which again means variation in time, temperature, concentration and type of acid, you have it in your power to extract more or less of the pentosans from the natural fibre.

In practice the intensity of this process depends on what you wish to do with the acid pretreated material, after it has been pulped by an alkaline process and followed normally by bleaching.

Our intention was to produce economically a pulp for paper-making which has to retain a high quantity of hemicellulose, otherwise the pulp would not hydrate well and would be unsatisfactory for paper making.

May I say here that, although we have searched in many countries, and I have

New Fellows and Associates of the RIC

Pass Lists of the September Examinations

RESULTS of the September examinations of the Royal Institute of Chemistry have now been announced. The eight new Fellows are these:—

Branch E: The chemistry including microscopy, of food and drugs and of water:—

ALLEN, David George, B.Sc.(Lond.); ANDREW, Miss Gertrude Garland, B.Sc.(Liv.); DAVIES, David Richard Aylmer, B.Sc.(Wales); HUGHES, John Sylvan, B.Sc. (Lond.); JONES, William Elwyn, M.Sc.(Wales); RYMER, Thomas Edward; SCOTT, Franklin Clermont, B.Sc. (Lond.).

Branch G: Industrial chemistry, with special reference to petroleum.

Associateships, numbering 37, were awarded as follows:—

ALLAN, Frederick James, Technical College, Paisley; BARGH, Jack, Lancaster and Morecambe Technical College; BAYLEY, Edwin Stanley, Wolverhampton and Staffordshire Technical College; BENNETT, Albert Walter, Technical College, Coventry; BIBBY, Robert Heslam, Lancaster and Morecambe Technical College; CLARK, Arthur Wellesley Stewart, B.Sc.(Lond.), Technical College, Paisley; CLARK, Ronald, Sir John Cass Technical Institute, London; CLAYTON, Joseph, College of Technology, Manchester, and Royal Technical College, Salford; COLES, Lewis Edwin, B.Pharm.(Wales), Technical College, Cardiff; COMPTON, John, B.Sc. (Lond.), Battersea Polytechnic, London; COMRIE, Allan McIntyre, B.Sc.Pharm.(Glas.), the University and Royal Technical College, Glasgow; CRAVEN Anthony Ronald, College of Technology, Manchester, and Royal Technical College, Salford; DRAKELEY, Kenneth Douglas, Central Technical College, Birmingham; HARRISON, George Maxwell, Technical College, Huddersfield; HERSOM, Albert Charles, West Ham Municipal College and Sir John Cass Technical Institute, London; HOWE, Brian Keith, King's College and Battersea Polytechnic, London; HO-YEN, Joseph Ephraim, B.Sc.(Lond.), Chelsea Polytechnic, London; KNIGHT, Roy Albert, B.Sc.(Lond.), Acton Technical College, London; MAY, Albert Edward, South-West Essex Technical College, Walthamstow; MUIR, John Wilson, B.Sc.Agric.(Glas.), the University and Royal Technical College, Glasgow, and Robert Gordon's Technical College, Aberdeen; NODEN, Frederick Gerald, Technical College, Widnes; PARKER, John Colin, Technical College, Newport; REEVE, Lawrence, Royal Technical College, Salford; RUSSELL, James, College of Technology, Leeds, and Technical College, Bradford; SAUNDERS, John Joseph, City College of Technology, Liverpool; SHALGOSKY, Harry Ian, Municipal Technical College, Hull; SMEATON, Robert Scott, Royal Technical College, Glasgow; STONES, William Frederick, Rutherford College of Technology, Newcastle-upon-Tyne; TANDY, Graham Herbert, College of Technology, Bristol; TAWN, Alec Richard Hornsey, Municipal Technical College, Hull, and the Polytechnic, Regent Street, London; WAIN, Brian Jack, Central Technical College, Birmingham; WALKER, Kenneth John, Technical College, Bradford; WEST, Charles Samuel, Technical College, Derby; WESTWOOD, George Ernest, Municipal Technical College, Hull; WHITING, Roland, Municipal College, Hull; WILDE, Raymond John, South-East Essex Technical College, Dagenham; WOOD, Robert Ivan, Technical College, Coventry, and Northern Polytechnic, London.

PAPER AND TEXTILE FIBRES

(*continued from previous page*)

troubled many of my friends abroad and have made thorough searches also in Germany, it seems to us that we have been, to say the least, one of the first to suggest this process for the manufacture of paper pulp.

I had always the feeling that very often the importance of the pH value is overestimated, because the pH is far from being the only important factor and the individual properties of the acid should not be neglected.

About two years ago, I thought that we should use our experience with the acid pretreatment of paper-maker's cellulosic raw material for desizing of cotton goods, since we had learned much about how far we can go without damaging the fibre.

We also made some investigations of after-treatment of clean alkali-boiled pulp with hot acid and it was always a failure until we reduced the temperatures and made milder the other conditions.

Having in mind the low critical temperatures necessary when dealing with hydrolysis of cellulose within our desired limits, we think we have found our way for an acid after-treatment of pulp and even—maybe—textiles.

First of all we propose to use milder and different acids and use a powder, which can be more easily transported, stored and handled in the mills than is the case with strong acids. We add to that some suitable detergent, whose action is not necessary to describe. We have had reports of small-scale desizing trials which show that it is effective and has left the fibre strong.

Such a powder consists of nine parts of sodium bisulphate and one part of an acid resistant wetting agent, and in this case, we have also used Estralane, a sulphonated fatty alcohol.

I have stressed the severe competitition between the two trades, and I remain of the opinion that it will in some ways become more severe. It is desirable for each to watch development of the other and to take advantage of processes which can be adapted to either. Even though such competition may be severe, there is sufficient room for the development of both industries without harm to either.

AMERICAN CHEMICAL NOTEBOOK

* * * * From OUR NEW YORK CORRESPONDENT

CONCLUDING a year-long investigation of the five-day "smog" which killed 20 persons and made nearly 6000 ill a year ago at Donora, Pennsylvania, the United States Public Health Service states in a 173-page report that the smog was the result of an unusual combination of warm, stagnant air and heavily smoke-polluted fog. The disaster proved "for the first time that air contamination in an industrial community can actually cause acute disabling diseases." Releasing the report, Surgeon General Leonard A. Scheele, of the Public Health Service, called for immediate research on both air pollution *per se* and the effect of polluted air in shutting out sunlight. He said that he was calling upon Congress for $250,000 as an added appropriation to aid in the furtherance of the work. Dr. Scheele said that Donora probably experienced another serious smog period in April 1945, "when there were almost twice as many deaths in the town as in any ordinary April or any ordinary month." To prevent such a recurrence, he recommended that fog-afflicted industrial centres keep a close watch on weather conditions and that operations of industrial plants be curtailed or shut down when dangerous conditions appear to be developing. No one chemical was found to be the cause of deaths and illnesses, although sulphur dioxide was listed as chief agent, coming from railroads, steamboats, and homes as well as from the Donora steel and wire and zinc plants. Older people, of 55 or over, were the most susceptible.

* * *

The General Electric Company, Schenectady, is to grant non-exclusive licences on reasonable terms relating to one of its patents embodying a process of surface hardening of metals by cementation with antimony. U.S. Patent No. 2,032,912 refers to hardening articles of metals and alloys having a melting point between 750° and 1550°C., and containing 1-10 per cent manganese. The articles are electroplated with antimony and, at a temperature ranging from 400° to 620°C., a hardened layer consisting of a ternary compound of the metal is formed. The articles are further hardened by quenching and re-heating to 200-350°C.

Two new publications, "Chemical Safety Data Sheet SD-35" on methyl bromide, and a revised edition of the manual "Warning Labels," have just been issued by the Manufacturing Chemists' Association, Inc., Washington, D.C. The safety data sheet, the 35th in the series, offers essential information for the safe handling and use of the chemical. The data cover physical and chemical properties; shipping containers and materials handling, and indicate personal protective equipment. Health hazards and their control are also covered. The second publication is a completely rewritten and revised edition of the manual, "Warning Labels," which made its original appearance in 1945 and has been broadened in its scope. The 86-page manual is divided into three parts: (1) General principles involved in the design and preparation of warning labels for hazardous chemicals; (2) 180 illustrative warning labels for industrial chemicals; (3) 58 illustrative warning labels for industrial poisons. The principles set out have served as a basis for labelling requirements issued by several States and territories. The manual is intended to facilitate an effective, uniform pattern of chemical labelling throughout the U.S. industry.

* * *

The development of a new durable flame-retardant chemical, called "Erifon," for cotton and rayon textiles, which does not change the appearance or "feel" of those materials, and is durable to dry-cleaning, normal laundering, and weathering, has been announced by E. I. Du Pont de Nemours & Co., Inc. An inorganic chemical, Erifon is stated to differ from other flame retardants in that it reacts chemically with the cellulosic molecule of fibres, rather than merely coating the fibre surface. Consisting of a solution of titanium and antimony salts, it is claimed that Erifon will last the life of the fabric despite frequent dry-cleaning or normal home laundering, and exposure to rain and sun. Its effectiveness is weakened, however, by processes frequently used by commercial and industrial laundries. A flame held to any of the treated materials is said to char the fabric at the point of contact but the flame does not spread.

RECORD AMERICAN EXPORTS

Europe Still Takes Most U.S. Chemicals

UNITED States exports of chemicals and allied products in the first half of 1949, officially listed at $449,549,510, were the highest for any half-year recorded. Declines from this record total are expected for the second half of the year; preliminary July and August figures indicate that exports in these months amounted to $58,811,818 and $58,549,994, respectively. These results have just been recorded by the U.S. Department of Commerce.

Commenting on the international monetary changes, the Office of International Trade officials said they did not believe currency devaluations by major foreign buyers of American chemicals will have an early, appreciable effect on chemical exports. It is anticipated, however, that foreign chemical producers, whose U.S. sales had fallen during the past year, may cut their export prices to stimulate sales. This would be coupled with efforts to dispense with purchases from America. "The high quality of American-made chemicals" would continue to weigh heavily with foreign buyers.

The record high total of chemical exports in the first half year compares with exports of $444.5 million in the first half of 1948, and $414 million in the second half of 1948. The United States imported $125,905,618 worth of chemicals and allied products in the first half of 1949, but preliminary figures suggest that imports fell to $5,159,774 in July and about $7 million in August. Chemicals and allied products imports were $152,787,745 in the first half of 1948.

Chemicals specialties have come into prominence. Exports in this group amounted to $97 million in the first half of 1949, as compared with $81 million and $76 million in the first and second halves of 1948, respectively.

Other major U.S. chemical exports were these :—

	Jan.-June 1949 $	Jan.-June 1948 $
Medicinals and pharmaceutical products ...	97,100,000	96,000,000
Coal tar products	52,500,000	58,700,000
Industrial chemicals ...	68,000,000	75,000,000
Pigments, paints, and varnishes	41,300,000	42,000,000
Fertilisers	42,000,000	36,000,000
Naval stores, gums and resins	16,200,000	13,700,000
Sulphur	16,600,000	14,000,000

In every major group the value of exports in the first half of 1949 was greater than in the second half of 1948.

During the first half of 1949, Europe was the chief market for United States chemicals—a total of $130,833,647. Other important buyers were: America south of the Rio Grande, $122,381,559; Canada, $62,562,146; Asia, $102,765,824; South America, $71,796,385; Africa, $13,685,184 (with about half of this total going to the Union of South Africa); and Oceania (chiefly Australia), $8,086,911.

Among European purchasers, France first with $24.6 million, followed by the United Kingdom, $24.2 million; Italy, $15.8 million; Germany, $14.5 million; and Greece, $4.2 million.

The drop in U.S.A. chemical imports from Europe occurred chiefly in the United Kingdom, whose sales fell from $6.8 million in January-June 1948 to $4.4 million in the same period of 1949.

Parliamentary Topics

ASKED what increases there had been in the prices of the raw materials exported from the sterling area to the dollar area since September 18, the President of the Board of Trade said that, compared with the price ruling before that date, the dollar price of tin had been reduced by 8 cents a lb. This represented a rise in the sterling equivalent of tin exported from Malaya of about 33 per cent. Increases in sterling market prices for rubber (by 20 per cent), for rough diamonds (by about 25 per cent), jute and sisal (each by about 10 per cent) had been reported.

DEALING in tin are to be resumed on the London Metal Exchange on November 15; this information was given by the Minister of Supply in answer to a question by Sir John Mellor.

IN a written answer to Mr. J. F. Platts-Mills, the Minister of Supply (Mr. G. R. Strauss), stated that no radioactive isotopes had been supplied to Germany for atomic research. Isotopes had been supplied for medical and general research, against orders sponsored by the British scientific adviser in Western Germany. Conditions of sale included obligation to publish the results of research.

Technical Publications

THE problem of dealing with the accidental dispersion into the air of zinc oxide from rotary-type refining furnaces is discussed in the autumn issue of "Smokeless Air," the journal of the National Smoke Abatement Society. It quotes an instance where the nuisance was overcome by enclosing the furnaces, and providing ducts to carry away the zinc oxide to cyclones, coolers and a bag filtration plant. Approximately 100 per cent of zinc oxide was stated to have been recovered and prefabricated bungalows had been safely positioned on land adjoining the works.

* * *

CHEMICAL Safety Data Sheet SD-34 on Tetrachloroethane, designed for supervisory staffs and management, has just been published as the 34th in the series, by the Manufacturing Chemists' Association, 246 Woodward Building, Washington, D.C. The manual (20 cents) sets forth important physical and chemical properties, handling techniques, and recommends personal protective equipments. Health hazards and their control are also dealt with.

* * *

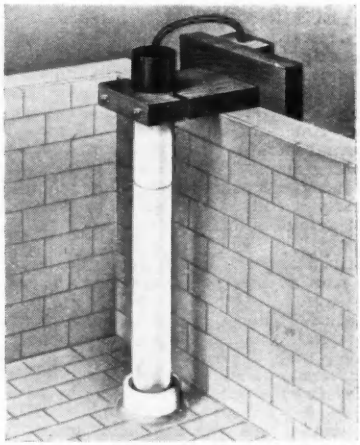
THE 1950 edition of "Physical Properties of Synthetic Organic Chemicals," has just been issued by the Carbide and Carbon Chemicals Corporation, New York. The 16-page booklet, designed as a condensed guide for users of organic chemicals, contains, in tabular form, data on applications and physical properties of more than 200 synthetic organic chemicals.

* * *

COMPLETE sets of the 21 reports and papers presented and discussed at the fourth International Gas Conference in London in June, and the official proceedings of the conference, are obtainable (3 gns. per set, post paid) from the secretary of The Institution of Gas Engineers, 1 Grosvenor Place, London, S.W.1.

* * *

ONE of the most comprehensive of recent reviews of current scientific (and other) literature associated with husbandry is the newly issued *Revue Internationale des Industries Agricoles*. This provides (in French) a great number of short summaries of the themes of recent publications in many countries and the essential information for those who wish to procure the originals.



[Courtesy, The Thermal Syndicate Ltd.

The Vitreosil electric immersion heater

THERE are many instances, such as pickling liquors and those used in metal plating processes, where acid liquors can with advantage be heated electrically. For this purpose it is, of course, essential that the envelope of the electric heating unit should be acid-proof in addition to being a good insulator and unaffected by thermal shock. The Vitreosil (pure fused silica) electric immersion heater now available from The Thermal Syndicate, Ltd., Wallsend, Northumberland, incorporates a number of new features including fitting with a rubber seal and the marking of the minimum immersion depth by a safety line round the envelope; the outer surface of the heater is glazed facilitating cleaning, and giving greater resistance to chemical attack.

* * *

TIMELY warning of the dangers that attend the use of rubber solution in surfacing floors is given in the technical notes of the *F.P.A. Journal* (No. 7, October, 1949), issued by the FOC Fire Protection Association. A number of explosions have occurred due to the vapour given off by the solvents used in the rubber solution being drawn to a source of heat. The association also announces that it will be represented on stand No. 410, at the Building Exhibition at Olympia, London, next month.

· PERSONAL ·

RECOGNITION of his valuable work on research in essential oils is given to SIR JOHN SIMONSEN in *Chemical and Engineering News* (Vol. 27, October 10), on the occasion of his receiving, in Atlantic City, U.S.A., the Fritzche Award of the American Chemical Society. The journal's front cover shows a composite photograph of a portrait of Sir John, showing the gold medal behind him, and nearly a full page is given to biographical details of his career.

DR. JOSEPH ROTBLAT, senior lecturer in physics at Liverpool University, has been appointed to the chair of physics at the Medical College, of St. Bartholomew's Hospital, London. The doctor, who is a Pole, took a physics degree at Warsaw University and devoted his work to nuclear research. When only 26 years of age, he gained his D.Ph., and was appointed assistant director of a new laboratory of atomic physics. Although unable to speak English when he left Poland, within five months of his arrival in England he was lecturing to students at Liverpool University. The doctor was a member of Sir James Chadwick's team on atomic research both in this country and the U.S.A., and he is a consultant to the AERE, Harwell, and a member of the council of the Atomic Scientists' Association.

MR. GAVIN HAMILTON, general manager, lamp and glass works, British Thomson-Houston, Ltd., relinquishes next week his executive duties. MR. T. J. DAGLEY is to be general manager of the glass factories and of glass and lamp-component sales. MR. S. R. EADE will be manager of the lamp factories.

MR. E. R. L. FITZPAYNE, general manager, Glasgow Corporation Transport, has been appointed a member of the Oil Consumers Council. He succeeds Mr. Vance Morland, who has resigned on taking up a post with the Road Passenger Executive, British Transport Commission.

PROFESSOR WOLFGANG PAULI, colloid chemist and winner of the Nobel Prize in 1945, celebrated his 80th birthday in Zurich last month. A tribute was paid to his work in the September issue of the *Austrian Chemical Journal*.

DR. J. G. SLATER, formerly Director of Operational Research, Admiralty, has been appointed director of research and development of the aluminium division of Tube Investments, Ltd.

MR. CHARLES FREDERICK RATCLIFFE BROTHERTON, of Kirkham Abbey, Yorks., chairman of Brotherton and Co., Ltd., Leeds, left £917,676, net £861,647 (duty paid £579,419).

Fertiliser Team

THE Fertiliser Manufacturers' Association announced this week that the following comprise the fertilisers productivity team which sailed to-day (Saturday) in the liner *Queen Elizabeth* for a six weeks' survey of the U.S. industry:—

Leader: Mr. J. H. Smith (Fisons, Ltd., Goole); secretary, Mr. W. L. Nicol (Scottish Agricultural Industries, Ayr). Supervisory group: Mr. J. W. Bews (Scottish Agricultural Industries, Leith) and Mr. A. H. Hemington (Fisons, Ltd., Boston). Technicians: Mr. C. Akester (The Farmers' Company, Ltd., Barton-on-Humber), Mr. F. R. Cook and Mr. R. F. Miles (both Fisons, Ltd., Ipswich) and Dr. T. H. Henry (I.C.I., Ltd., Billingham). Workshop group: Mr. R. C. Bostock (Edward Webb & Sons (Stourbridge), Ltd.), Mr. J. Edwards (Scottish Agricultural Industries, Carnoustie), Mr. J. Thomas (Fisons, Ltd., Liverpool) and Mr. E. N. Woods (Fisons, Ltd., Avonmouth).

Obituary

The death has occurred at Helenlea, Shotts, Lanarkshire, of MR. ADAM BUCHANAN ALLISON, who recently retired as works manager of the Shotts Iron Company, Ltd., Shotts. He was 70. A member of the Iron and Steel Institute of Scotland, he was for a number of years a member of the Lanarkshire County Council.

The death occurred recently of MR. ALEXANDER O'BEIRNE, managing director of A. Cockburn and Co. (Engineers), Ltd., Glasgow. Mr. O'Beirne, who was 71, was joint founder of the company in 1907.

HOME

£100,000 for Steel

A £100,000 scheme for the re-organisation of the Ivor Works Foundry, Dowlais, near Merthyr Tydfil, was announced last week on behalf of Guest, Keen & Baldwin, Ltd.

Coal Production

Britain's output of deep-mined coal last week rose by 72,300 tons over the previous week. Comparative figures are: Last week, total 4,398,700 tons (4,152,700 tons deep-mined, 246,000 tons opencast). Previous week, total 4,342,700 tons (4,080,400 tons deep-mined, 262,300 tons opencast).

Soap Tablets

A novelty introduced at the Modern Homes Exhibition in Glasgow is a "soappill" designed to provide simple portable washing equipment. It is a non-caustic ration-free tablet, slightly larger than an aspirin and capable of giving a quick lather. At the Kelvin Hall exhibition 4000 tablets were sold in four hours.

Torry Research Station Damaged

Fire last week in the chemical section of the Torry Research Station, Aberdeen, destroyed the photographic department and severely damaged several other parts of the building. The research centre is in process of being doubled in size to meet the needs of the DSIR. It is the main British centre for research work on the preservation, handling, storage and processing of fish.

Whaling Expedition Sails

The 15,715-ton whaling factory ship *Balaena*, most scientifically equipped of its kind, which is to lead the 25 factory ships on the 1949-50 Antarctic whaling expedition of seven months, arrived in the Mersey last week from Norway. She stayed only to pick up 80 British members of her crew and special stores unobtainable in Norway, and left the following evening for the Antarctic.

Scientific Film Series

A series of films is to be shown by the London Scientific Film Society in the Royal Empire Society Hall, Northumberland Avenue, London, W.C.2 at 7.15 p.m. on the middle Wednesday of each month from October to March, 1950. The first exhibition was on October 19 and included "Nature of Plastics" (colour), "Heating Research for Houses," "Turbo Jet Propulsion," and "Atomisation."

Another Packaging Exhibition

Because of the success of the First National Packaging Exhibition, the Empire Hall, Olympia, has been booked for a second exhibition, to be held early in November next year. Several firms report that they took enough business in the first few days to absorb their entire production capacity for the coming year.

Spanish Production and Research

Bamag, Ltd., London, points out that the nitric acid plant being erected by Nitratos de Castilla in Valladolid, was designed, and drawings prepared, in London, and its engineers are at present carrying out the construction. The plant was not manufactured by Bamag-Meguin as reported by *Dyna* (1949, 24, 315-322) and quoted in THE CHEMICAL AGE (*61*, 495-496).

"Shell" at Textile Exhibition

The work of several well-known artists, symbolising raw material used in the textile industry, was on view at Shell Chemicals' stand in the Textile Machinery and Accessories Exhibition, Manchester, which closed last week. The Shell stand, which was designed by Ian Jeffcott, L.R.I.B.A., showed samples of material treated with the company's products.

U.K. Light Metal Statistics

Ministry of Supply statistics relating to U.K. production, imports and consumption of light metals in August, include the following (in long tons):—Virgin aluminium: production 2571, imports 20,418. Secondary aluminium: production 4995. Aluminium scrap arisings: total 6770, consumption 6690. Aluminium fabrication: 16,173. Magnesium fabrication: 288.

Deferment for Textile Technologists

An agreement reached by the Textile Institute with the Ministry of Labour provides for deferment of call-up for national service of students intending to obtain professional qualifications in the textile industry. Temporary exemption is provided for students taking part-time or whole-time courses of study which lead to, or give exemption from, the Institute's examination in general textile technology. Students taking whole-time courses for university degrees, technical college diplomas, or other academic qualifications having the same effect, may also be deferred for the period of their whole-time studies.

OVERSEAS

Another Source of Isotopes

Norway's first atomic plant, to be constructed at Kjeller Aerodrome, near Oslo, which will supply isotopes for medical purposes, is expected to operate in 1951.

More Chilean Copper?

The management of the Chaquicamatta Copper Mine in Northern Chile intends to raise its production of the metal from 25 million to 30 million lb. monthly.

Manganese Exports to be Doubled

The Government of India proposes to double the export of manganese ore, one of India's main export items. Sixty per cent of the manganese ore produced in India comes from the Central Provinces, where the deposits are said to be the finest in the world.

India Admits Moulding Powder

The secretary of the All-India Plastic Manufacturers' Association, Bombay, states that the Government of India has agreed to the importation from soft currency areas of urea plastics moulding powders. The import licences would relate to the July-December, 1949, shipping period and would be subject to essentiality and a monetary ceiling.

U.S. Sulphur Production

Output of sulphur in the U.S.A. in July was 388,811 long tons and the total for the first seven months of the year of 2,772,284 long tons, was slightly lower than the same period of 1948. Apparent sales were calculated at 414,278 long tons, and stocks held by producers were 3,142,845 long tons, a decrease of 82,169 long tons since the beginning of the year.

U.S. Industries for Scotland?

Precision engineering and chemical engineering companies are among the firms which Sir Steven Bilsland, chairman of Scottish Industrial Estates, Ltd., and his colleagues of the Scottish Council (Development and Industry) hope to contact when in the U.S.A. and Canada. The deputation will meet interested industrialists there, to discuss the establishment of other American factories in Scotland. To avoid competition with established companies and to broaden the basis of Scottish industrial economy efforts will be directed to attract industries not yet fully represented in Scotland. Opinion in Scotland favours development of scientific instrument production, already started by U.S. firms.

German Industrial Revival

The U.S. Standard Oil Company is reported to be backing a large financial undertaking to rebuild oil storage tanks in Western Germany.

French Fluorite

Exploitation of fluorite in the Sauces seam, which was interrupted by the war, has just been resumed. It is stated to yield a minimum of 85 per cent F^2Ca and is therefore very good quality. By selection, even better quality is obtained.

German Bid Lowest

Because the German tender was the lowest and offered the quickest delivery, the contract for a 100-ton floating crane for Oslo, to cost about £75,000, has been given to the Lubecker Maschinenbau Company, Lubeck.

Future of Burma's Oil

The Burmese Government and the British-owned Burmah Oil Company are discussing proposed joint working of Burma's oil industry, the company's headquarters in Rangoon announced last week. Consideration of oilfield workers' demands on employment terms have been suspended during the talks.

More Coal from Britain?

Three representatives of the National Coal Board have lately been having discussions, in Norway, with Norwegian importers. In Oslo, writes the newspaper *Norges Handelsog Sjöfartstidende*, it is supposed that the visit represents an effort by the NCB to regain some of the markets which British exporters used to serve in the Scandinavian countries before Polish coal became a serious competitor in the 1930's. As Poland has not devalued, its exports are now rather more expensive in Norwegian currency.

Developing French African Oil

A company to explore and exploit oil resources of French Equatorial Africa has been established recently in Port-Gentil (Gaboon) with a share capital in local currency equal to Fr. 1550 million. The French Government and the Colonial Government are reported to have taken up over 80 per cent of the share capital, chiefly through the Bureau de Récherches des Pétroles. The balance has been taken up by the private oil companies, the Compagnie Française des Pétroles and the Rociéte de Récherches Minières et Pétrolières Coloniales.

GERMAN BIDS TO AVERT DISMANTLING

Chemical Production Resumes Its Advance

CHEMICAL production in Western Germany has resumed the advance which was interrupted during the summer by seasonal and market factors, but smaller firms are still complaining that they find it impossible to compete with products imported under ERP auspices. In the important industrial area of North Rhine-Westphalia, which includes the Ruhr, chemical production is recorded to have regained the 1936 level, which is regarded as a pre-war standard year. In this region chemical production is now one-fifth higher than it was at the end of last year.

The controversy over dismantling has entered a new and—from the German viewpoint—perhaps more promising phase. The Federal Government is working on proposals for the substitution of alternative plant and machinery for works on the dismantling list which German interests consider essential for the national economy. As far as the Fischer-Tropsch plants are concerned, the Government experts are proposing voluntary surrender of equipment specific to the synthetic oil process combined with a request for other equipment to be left in the works. Similarly, it will be suggested by the Federal authorities that the hydrogenation plants are to be adapted in such a way as to exclude the possibilities of their use for synthetic operations under high pressure; and if this suggestion is turned down, an alternative proposal is said to be ready for submission to the High Commissioners.

Idle Plants

The order that dismantling of the synthetic rubber installations at Farbenfabriken Bayer in Leverkusen was to begin on October 24 was received with the usual disapproval, but in fact these installations have been idle for some time. German interests would like to retain synthetic rubber manufacturing capacity for those grades which are technically superior to natural rubber.

The inter-zonal trade agreement, reached after great difficulties, provides for chemical deliveries from Western Germany to the Soviet zone totalling DM 30 million and chemical deliveries in the opposite direction of DM 21 million. Half the western exports will consist of dyes and pharmaceuticals; coal-tar, soda, naphthalene, barium carbonate and insecticides are also important on the list of chemicals which the eastern zone wishes to buy from the west. In return, the Soviet zone is to supply sulphur, photographic film, pharmaceuticals and crude kainite, but considerable doubt exists on both sides as to the extent to which the agreement will, in fact, be carried out.

Trade agreements have also been concluded by Western Germany with Austria and Italy. Western Germany will send another $3 million worth of chemicals to Italy by July 31, 1950.

Industrial Reorganisation

The two former I.G. Farbenindustrie plants at Leverkusen and Hoechst have now completely separated their selling organisations for pharmaceutical products and are marketing these under the brand names of Bayer and Hoechst.

Badische Anilin- und Sodafabrik, Ludwigshafen, hopes to supply 110,000 tons (N) of fertilisers to German agriculture in 1949/50 and intends to increase its output further if dismantling at Oppau is discontinued.

The manufacture of sodium tripolyphosphate has been resumed by Chemische Werke Albert at Wiesbaden-Biebrich. The company is also offering a new timber preservative on a fluor-ammonium basis. Rheinische Kunsteide A.G., Krefeld, hopes to return to full-capacity operations in its rayon section by the end of this year. Other artificial fibre plants of the company are already in full operation.

Important prospects attach to the knowledge gained about the pertoleum deposits in the Emsland district near the Dutch frontier, in the central part of Lower Saxony, and near Hamburg. The total underground reserves are now estimated at about 20 million tons, compared with 10.6 million tons in 1947. High hopes are being entertained for a new oilfield discovered north-west of Lingen, where a deposit 5 km. long and 2 km. wide is supposed to exist. Latest prospecting suggests that this deposit may extend over a length of 10 km. The German crude oil output declined slightly in September to less than 75,000 tons, but the 1949 production is expected to exceed 800,000 tons, compared with 628,000 tons in 1948. By 1952 an increase to 1.5 million tons is anticipated, provided modern drilling equipment can be secured.

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Next Week's Events

TUESDAY, NOVEMBER 1

Electrodepositors' Technical Society

Birmingham: James Watt Memorial Institute, Great Charles Street, 6.30 p.m. H. Silman and Dorothy Wernick: "Electrodeposits as Bases for Paints."

Institute of Physics

Dundee: University College, 4.30 p.m. (Scottish Branch). Prof. P. I. Dee (Glasgow University): "Recent Advances in Nuclear Physics."

WEDNESDAY, NOVEMBER 2

The Chemical Society

Dublin: University College, 7.45 p.m. J. G. Belton: "Some Biologically Active Phenazine Derivatives."

Scientific Instrument Manufacturers' Association

London: 8-11 Queen Square, W.C.1, 2.30 p.m. Electronics Symposium, official opening by Sir George Thompson. (Thursday, November 3 and Friday, November 4, 10 a.m. to 5 p.m., technical papers).

Society of Public Analysts

London: Burlington House, Piccadilly, W.1, 6.45 p.m. Papers on "Some Recent Advances in Water Examination," followed by discussion.

Institute of Welding

Manchester: Reynolds Hall, College of Technology, 7 p.m. E. V. Beatson: "The Joining of Coated Metals."

Manchester Literary and Philosophical Society (Social Philosophy Section)

Manchester: Portico Library, Mosley Street, 5.30 p.m. Dr. F. D. Wilkins (Principal Director of Scientific Research (Development), Ministry of Supply): "Freedom and the Management of the Scientist."

Royal Society of Arts

London: John Adam Street, W.C.2, 2.30 p.m. Inaugural address. Ernest W. Goodale (chairman): "The State, the Society and Industry."

THURSDAY, NOVEMBER 3

The Chemical Society

London: Burlington House, Piccadilly, W.1, 7.15 p.m. Reading of original papers.

Bristol: University, 7 p.m. (Joint meeting with the RIC and SCI). Prof. C. A. Coulson: "What is a Chemical Bond?

Sheffield: University, 5.30 p.m. (Joint meeting with the Sheffield University Chemical Society). Dr. C. W. Suckling: "Some Aspects of the Organic Chemistry of Fluorine."

The Royal Institute of Chemistry

Brighton: Technical College, 6.30 p.m. N. Booth: "Careers for Chemists." First of four meetings for students and senior school children. Brains Trust.

The Royal Society

London: Burlington House, Piccadilly, W.1, 4.30 p.m. T. B. Grimley: "Contact Between a Solid and an Electrolyte"; J. R. Whitehead: "Surface Deformation and Friction of Metals at Light Loads."

The Textile Institute

Manchester: 16 St. Mary's Parsonage, 7.15 p.m. W. P. Hazeldine and L. Klein: "Textile Trade Wastes and their Treatment."

FRIDAY, NOVEMBER 4

Society of Chemical Industry

Reading: University, 5.30 p.m. (Joint meeting of the London Section with the Food and Agricultural Groups and the RIC). Dr. J. B. M. Coppock (director, British Baking Industries Research Association): "Some Present Trends in Bakery Research." Preceded at 2.30 p.m. by visit to a biscuit factory.

Royal Statistical Society

London: 2 Savoy Hill, W.C.2, 6 p.m. Symposium on "The Repeatability and Reproducability of Test Results." Speakers: R. Claxton (National Benzol Association); A. H. Dodd (Newton, Chambers, Ltd.); J. R. Fraser (Government Laboratory); R. G. Newton (Rubber Producers' Research Association); and A. E. Worley (Reckitt and Colman, Ltd.)

SATURDAY, NOVEMBER 5

Institute of Physics

Swansea: University College, 2 p.m. (South Wales Branch). Dr. F. C. Toy (president): "Some Applications of Classical Physics in the Textile Industry."

Modern Building Technique

The International Building Trades Exhibition, which is to open at Olympia on November 17, is supported by some 30 firms, whose products are, directly or indirectly of interest to the chemical engineer and manufacturer. The ventilation of buildings, glazed partitioning for office use, and hot dip galvanising for gutters and other fittings are among the supplies to be shown, and for which recent improvements are claimed by G. A. Harvey & Co. (London), Ltd.

CHINA'S MINERAL WEALTH

Vast Resources Await Development

ONE of the effects of the civil conflict which has for years been disrupting China, has been to deprive the world of an enormous reservoir of mineral wealth, which has never been fully exploited.

Some of the occurrences of the wide range of minerals are described in this article, which is abstracted from *The South African Mining and Engineering Journal* (*60*, part II, 99 and 101).

China's anthracite deposits are estimated to exceed 400,000 million tons. Possibly much coal classed as anthracite in China may turn out to be semi-bituminous or high-grade bituminous coal, but, at all events, the coal reserves can aptly be described as inexhaustible.

Coal is found in practically every province, the principal producing areas being the Chihili-Tanshan and the Kiangsi-Pingshiang regions. In some areas mining is primitive and the coal is carried long distances on donkey or camel back to the nearest markets. Some important collieries are purely Chinese concerns, managed and engineered entirely by Chinese.

Iron is found along the Yangtze valley, but the major producing districts are the Hupeh-Tayeh and Manchurian-Penchihu regions. In the range of hills north of the Santung Railway iron ore is found in contact with diorite and chalk and has been smelted since ancient times.

Pure Iron Ore

The iron ore of Tientsin in the Shantung Province is stated to be the purest obtainable in the world. Engineers have estimated the deposit to contain 49 million tons of ore, of which 20 million can be easily mined. It was developed for a number of years by the Germans, who were eventually supplanted by the Japanese.

Both limonite and hematite are found throughout the Shansi Province. The deposits are not extensive and occur in layers ranging from a few inches to 3 ft. in thickness. In the Szechwan Province these ores are smelted with an average extraction of 45 per cent, charcoal being used for fuel and limestone as flux.

In 1923, which was probably the peak year, about 800,000 tons of hematite were mined. China's most important iron mines are situated at Tayeh, in the Hupeh Province, 15 miles from the Yangtze river.

The bulk of the world's antimony production at one time came from China, her contribution in 1937 being 14,702 tons out of a total of 38,600 tons. The metal came mainly from Changsha in Hunan Province.

China is also the world's largest producer of salt, the output for 1937 (including Manchuria) being estimated at 3 million tons. Mineral salt is found in the Yunnan Province, the principal producing district, the most important salt well being in Weiyan.

Copper

At Malipa and Tungchwan in Yunnan copper was mined to supply China and Burma with their requirements for currency and other needs. The copper is found native in thin laminæ, while the mines produce malachite and azurite.

One of the richest mineralised zones in the world is the Chienchang valley in the Szechwan Province, where alluvial gold is found in all the rivers. Oxidised lodes are worked by primitive methods, the sulphides being discarded on account of their refractoriness.

At the Shuikowshan mine in Hunan lead has been worked for 200 years by primitive methods. In 1896 a shaft was sunk to 300 ft. and in 1916 a second shaft and a new plant were completed. The ore is a mixture of galenite, sphalerite and pyrite and carries lead up to 33 per cent, zinc up to 29.40 per cent and silver up to 21.2 per cent.

Arsenic is produced in Hunan as a by-product from the treatment of tin ore carrying phyrrhotite, while an extensive deposit of realgar (arsenic bisulphide) is found near Tzeil in Northern Hunan.

In the southern part of Hunan are tinfields which have been worked for many years. The most interesting occurrence is at Ichanghsien where a dyke of granite has penetrated the limestone; along the course of this dyke are found true pipes of tin ore, associated with pyrrhotite and other minerals. The pipes are roughly circular and have diameters up to 20 ft., the maximum depth reached being about 400 ft.

Other minerals are known to occur in China to a limited extent.

Law and Company News

Commercial Intelligence

The following are taken from the printed reports, but we cannot be responsible for errors that may occur.

Mortgages and Charges

(Note.—The Companies Consolidation Act of 1908 provides that every Mortgage or Charge, as described herein, shall be registered within 21 days after its creation, otherwise it shall be void against the liquidator and any creditor. The Act also provides that every company shall, in making its Annual Summary, specify the total amount of debt due from the company in respect of all Mortgages or Charges. The following Mortgages and Charges have been so registered. In each case the total debt, as specified in the last available Annual Summary, is also given—marked with an *—followed by the date of the Summar ,but such total may have been reduced.)

DELMARCO, LTD., Leigh (Lancs.), detergents and manufacturers agents. (M., 29/10/49.) September 29, £2500 to Askford Finance Co., Ltd.; general charge.

Company News

Laporte Chemicals, Ltd.

The directors announce the intention to pay an interim dividend of 2¾ per cent on December 1.

Increases of Capital

The following increases in capital have been announced: FISONS, LTD., from £7,000,000 to £8,500,000. XZIT (G.B.), LTD., from £4000 to £30,000.

New Registrations

F. & R. M. Harris (Birmingham), Ltd.

Private company. (473,960). Registered October 15. Capital £2000. Consulting chemical engineers and manufacturers and suppliers of chemical plant and equipment, etc. Directors: F. Harris and M. Harris. Reg. office: 17-18 Doe Street, Birmingham.

W. Gwennap (Agricultural), Ltd.

Private company. (474,020). Capital £15000. Chemical engineers, horticultural and agricultural manufacturing chemists, etc. Directors: W. Gwennap, F. J. Williams. Reg. office: 55 Wolverhampton Road, Stafford.

Northern Analysts, Ltd.

Private company (474,011). Registered October 17. Capital £1000. Objects: To acquire the business of consulting analysts carried on by E. Chapman and J. R. Hunecke at 7 Lowgate, Hull. Directors: E. Chapman, J. R. Hunecke. Solicitors: Drury and Taylor, Goole.

ELECTRONIC INSTRUMENTS

Uses in Industry and Research

THE increasing and varied uses of electronic instruments and their application to industry, education and scientific research, will be the subject of a three-day symposium in London next week.

Sir George Thompson will officially open the symposium at 2.30 p.m. on Wednesday, November 2, in the examination Hall, 8-11 Queen Square, W.C.2, and the first paper will be by Denis Taylor (AERE, Harwell), who will discuss electronic instrumentation in relation both to measurement and control in atomic research.

Electronic and magnetic amplifiers will be the subject of papers by I. L. Banks and A. V. Hemingway respectively at the morning session on Thursday, November 3.

At the final session of the symposium (November 4), which is organised by the electronics group of the Scientific Instrument Manufacturers' Association, P. H. Briggs will speak on "An Industrial Electronics Servo Mechanism," and A. J. Maddock will cover the co-operative research at the British Scientific Instruments Research Association.

No Shortage of Resins

THE Wood Committee of the OEEC has just completed a five-day session at Geneva, during which the representatives of 16 countries examined the question of natural resin supplies in Europe. It was concluded that European exporting countries would be able to sell all available resins abroad in 1949 and importing countries would be able to satisfy almost the whole of their needs. The committee also concluded that, if current provisions are carried out, there is unlikely to be a shortage in 1950.

The committee stressed that an important modification in Europe's resin situation might result when the exceptional losses resulting from the French forest fires were felt, and that it was therefore still important to increase exportable quantities of resin in 1951 and after. Negotiations with various countries have begun to enable France to dispose of her present surplus resins.

The committee also considered the possibility of obtaining future supplies of resins from Brazil and asked for further information on the subject.

Chemical and Allied Stocks and Shares

MOVEMENTS in stock markets this week have been in sharp contrast to those of a week ago, when prices were marked down on a wide front in anticipation of drastic measures to deal with problems arising from devaluation of the £ and the danger of inflation.

The rally this week was due mainly to the fact that Mr. Attlee's measures do not include a capital gains tax nor an increase in the stamp duty on Stock Exchange transactions. Both had been widely rumoured. It is realised, however, that the Government's proposals are by no means drastic enough and that unless there is a very big expansion in export trade, present probelms have not been solved.

Shares of chemical and allied companies, expectedly, have moved closely with the general trend, falling sharply towards the end of last week, and rallying again this week. Imperial Chemical, which had been down to close on 42s. have recovered to 43s. at the time of writing. Lever & Unilever, after being below 41s. recovered to 41s. 9d., United Molasses were 38s., after being below 37s., Courtalds 34s. 3d. after 33s. 3d., while British Celanese firmed up to 16s. 7½d.

Calico Printers are 21s. 6d. at the time of writing due to financial results and the raising of the dividend from 5 to 8 per cent in celebration of the company's jubilee. Glaxo Laboratories recovered from 18¼ to 18⅝. Turner & Newall were better at 75s. 4½d., British Oxygen 92s. 6d. and Dunlop Rubber rallied from 59s. 9d. to 61s.

Monsanto Chemicals have been steady at 51s. 3d., Fisons 27s., Albright & Wilsons firm at 30s. and Brotherton 10s. shares again 20s., F. W. Berk 2s. 6d. shares 13s., Bowman Chemical 6s. 9d. and Amber Chemical 2s. shares 5s. 3d. Pest Control 5s. shares were 8s. 4½d., L. B. Holliday 4½ per cent preference 20s. 3d. and British Chemical & Biologicals 4 per cent preference 18s. 9d. Boake Roberts 5s. shares eased to 28s.

British Xylonite strengthened to 68s. 9d. after an earlier decline, British Industrial Plastics 2s. shares were 4s. 7½d., De La Rue 20s. 6d., and British Glues & Chemicals 4s. shares 18s. Steadiness at 22s. 4½d. was shown by General Refractories and, elsewhere, Ilford were firm at 22s.

Amalgamated Metal shares at 17s. 9d. were unaffected by the pending re-opening of the London Metal Exchange for free dealings in tin. Electrical equipment shares also made some recovery from earlier losses, G.E.C. being 74s. 6d. and Crompton Parkinson 22s. 6d.

Iron and steels were better, but earlier declines were only partly regained. United Steel improved to 25s. 3d., Stewarts & Lloyds to 53s., Guest Keen to 38s. 9d., while elsewhere, Powell Duffryn were 26s. 6d. and Staveley 78s.

Boots Drug were better at 49s. 6d. despite the change for national health prescriptions, Sangers also improved to 21s. 6d., and Beechams deferred to 12s. 6d. British Drug Houses 5s. shares were 6s. 6d.

The higher oil prices helped oil shares. Shell moved up to 66s. 3d. Anglo-Iranian recovered to £7, and Trinidad Leaseholds to 23s. 9d. The rally in industrials earlier in the week is expected to give way to quieter conditions in stock markets now the position can be more clearly assessed.

Industrial Casualties

THE number of reported deaths from industrial accidents in the United Kingdom in August was 137, a decrease of six compared with the previous month, but 29 more than the revised figure for August, 1948.

In chemicals, oils and soaps, etc., there were nine deaths, according to the *Ministry of Labour Gazette* for September (57, 329), while six occurred in metal conversion, but none was reported in other metal trades.

The total number of cases reported under the Acts, numbered 27, as follows:—Aniline poisoning, five; anthrax, five; epitheliomatous ulceration (skin cancer) 14 (pitch, seven; tar, three: oil, four); chrome ulceration (chromium plating) three.

Rumanian State Trading

A list of State import and export companies, operated by the Rumanian Ministry of Foreign Trade is published in the *Board of Trade Journal, October* 22.

Among companies of interest to the chemical and allied industries is Romano-Export, which is partly concerned with the import of chemicals, drugs, laboratory equipment, minerals, etc. Petrol-Export sells petroleum and petroleum products and imports oil plant.

Prices of British Chemical Products

Good Export Demand for Sodium Chemicals

A SUSTAINED demand characterises most sections of the industrial chemicals market and, while there have been few price changes of any importance, the undertone of the market is firm. The movement of supplies to the textile and dyeing industries has continued on a fair scale, mainly against existing contracts, while some expansion in demand from the plastics industry is reported. There have been further adjustments in the convention quotations of white lead and red lead as a result of the change in the price of the metal. The latest basis price for dry white lead is £131 5s. per ton and for red lead £123 per ton. United Kingdom exports of chemicals, drugs, dyes and colours during September were above the average for the quarter and, judging by the volume of overseas inquiry in circulation at the present time, the figures for the current month should show even further improvement. There is an active demand for caustic soda and sodium chlorate and the soda products generally. The potash chemicals continue in strong request. Formaldehyde, hydrogen peroxide and white powdered arsenic are other items being taken up in fair quantities. Conditions remain unchanged on the coal tar products market and home trade in most products is only moderate.

MANCHESTER.—Chemical traders on the Manchester market during the past week reported a steady flow of delivery specifications against bookings in caustic soda, soda ash and most other alkalis. The general run of potash compounds are also in steady request, with a fairly satisfactory movement of supplies of the ammonia and magnesia chemicals. Fresh inquiries for both home and export buyers have also been dealt with. In the market for the by-products dull conditions continue to rule in a number of the heavy sections, but for the benzols, xylols and most of the light distillates the demand during the past week has been steady.

GLASGOW.—The Scottish chemical market has been fairly steady, but there is no doubt that devaluation is affecting business in general. The export market has so far not shown the expected improvement.

Price Changes

Rises: Borax, boracic acid, cobalt oxide, copper chloride, copper nitrate, red lead, white lead, zinc oxide, carbolic acid.

General Chemicals

Acetic Acid.—Per ton: 80% technical, 1 ton, £61; 80% pure, 1 ton, £66; commercial glacial 1 ton £71; delivered buyers' premises in returnable barrels; in glass carboys, £7; demijohns, £11 extra.

Acetic Anhydride.— Ton lots, d/d, £101 per ton.

Acetone.—Small lots: 5 gal. drums, £90 per ton; 10 gal. drums, £85 per ton. In 40/45 gal. drums less than 1 ton, £70 per ton; 1 to 9 tons, £69 per ton; 10 to 50 tons, £68 per ton; 50 tons and over £67 per ton.

Alcohol, Industrial Absolute.—50,000 gal. lots, d/d, 2s. 1d. per proof gallon; 5000 gal. lots, d/d, 2s. 2½d. per proof gal.

Alcohol, diacetone.—Small lots: 5 gal. drums, £133 per ton; 10 gal. drums, £128 per ton. In 40/45 gal. drums: less than 1 ton, £113 per ton; 1 to 9 tons, £112 per ton; 10 to 50 tons, £111 per ton; 50 to 100 tons, £110 per ton; 100 tons and over, £109 per ton.

Alum.—Loose lump, £17 per ton, f.o.r. MANCHESTER: Ground, £17 10s.

Aluminium Sulphate.—Ex works, £11 10s. per ton d/d. MANCHESTER: £11 10s.

Ammonia, Anhydrous.—1s. 9d. to 2s. 3d. per lb.

Ammonium Bicarbonate.—2 cwt. non returnable drums; 1 ton lots £40 per ton.

Ammonium Carbonate.—1 ton lots: MANCHESTER: Powder, £52 d/d.

Ammonium Chloride. — Grey galvanising, £22 10s. per ton, in casks, ex wharf. Fine white 98%, £21 to £25 per ton. See also Salammoniac.

Ammonium Nitrate.—D/d, £18 to £20 per ton.

Ammonium Persulphate.—MANCHESTER: £5 per cwt. d/d.

Ammonium Phosphate.—Mono- and di-, ton lots, d/d, £78 and £76 10s. per ton.

Amyl Acetate.—In 10-ton lots, £171 10s. per ton.

Antimony Oxide.—£140 per ton.

Antimony Sulphide.—Golden, d/d in 5 cwt. lots, as to grade, etc., 1s. 9½d. to 2s. 4¾d. per lb. Crimson, 2s. 6½d. to 3s. 3½d. per lb.

Arsenic.—Per ton, £36, ex store.

Barium Carbonate.—Precip., d/d; 2-ton lots, £25 15s. per ton, bag packing, ex works.

Barium Chloride.—£35 to £35 10s. per ton.

Barium Sulphate (Dry Blanc Fixe).—Precip., 4-ton lots, £26 10s. per ton d/d; 2-ton lots, £26 15s. per ton.

Bleaching Powder.—£25 15s. per ton in casks (1 ton lots).

Borax.—Per ton for ton lots, in free 140 lb. bags, carriage paid: Anhydrous, £59 10s.; in 1-cwt. bags, commercial, granular, £36; crystal, £38; powder, £39; extra fine powder, £40; B.P., granular, £45; crystal, £47-£48; powder, £48-£48 10s.; extra fine powder, £49-£49 10s.

Boric Acid.—Per ton for ton lots in free 1-cwt. bags, carriage paid; Commercial, granular, £64 10s.; crystal, £70; powder, £67 10s.; extra fine powder, £69 10s.; B.P., granular, £76 10s.-£79 15s.; crystal, £82; powder, £79 10s.-£81 15s.; extra fine powder, £81 10s.-£83 15s.

Butyl Acetate BSS.—£149 10s. per ton, in 10-ton lots.

Butyl Alcohol BSS.—£145 10s per ton, in 10-ton lots.

Calcium Bisulphide.—£6 10s. to £7 10s. per ton f.o.r. London.

Calcium Chloride.—70/72% solid, £8 per ton, in 4 ton lots.

Charcoal, Lump.—£25 per ton, ex wharf. Granulated. £30 per ton.

Chlorine, Liquid.—£28 per ton d/d in 16/17-cwt. drums (3-drum lots).

Chrometan.—Crystals, 6d. per lb.

Chromic Acid.—1s. 10d. to 1s. 11d. per lb., less 2½%, d/d U.K.

Citric Acid.—Controlled prices per lb., d/d buyers' premises. For 5 cwt. or over, anhydrous, 1s. 6¾d., other, 1s. 5.; 1 to 5 cwt., anhydrous, 1s. 9d., other, 1s. 7d. Higher prices for smaller quantities.

Cobalt Oxide.—Black, delivered, 8s. 5d. per lb.

Copper Carbonate.—MANCHESTER: 1s. 6½d. per lb.

Copper Chloride.—(53 per cent), d/d, 1s. 11d. per lb.

Copper Oxide. — Black, powdered, about 1s. 4½d. per lb.

Copper Nitrate.—(53 per cent), d/d, 1s. 9½d. per lb.

Copper Sulphate.—£36 5s. per ton f.o.b., less 2%, in 2-cwt. bags. (Nominal.)

Cream of Tartar.—100%, per cwt., about £7 8s. per 1-2 cwt. lot, d/d.

Ethyl Acetate.—10 tons and upwards, d/d, £103 10s. per ton.

Formaldehyde.—£31 per ton in casks, according to quantity, d/d. MANCHESTER: £32.

Formic Acid.—85%, £64 per ton for ton lots, carriage paid. 90%, £67 5s. per ton.

Glycerine.—Chemically pure, double distilled 1260 s.g. £123 per cwt. Refined pale straw industrial, 5s. per cwt. less than chemically pure.

Hexamine.—Technical grade for commercial purposes, about 1s. 4d. per lb.; free-running crystals are quoted at 2s. 1d. to 2s. 3d. per lb.; carriage paid for bulk lots.

Hydrochloric Acid.—Spot, 7s. 6d to 8s 9d. per carboy d/d, according to purity, strength and locality.

Hydrofluoric Acid.—59/60%, about 1s. to 1s. 2d. per lb.

Hydrogen Peroxide.—1s. 0½d. per lb. d/d, carboys extra and returnable.

Iodine.—Resublimed B.P., 10s. 4d. to 14s. 6d. per lb., according to quantity.

Iron Sulphate.—F.o.r. works, £3 15s. to £4 per ton.

Lactic Acid.—Pale, tech., £80 per ton; dark tech., £70 per ton ex works; barrels returnable.

Lead Acetate.—White, £107 per ton. (Nominal.)

Lead Carbonate.—British dry, ton lots, d/d, £115 10s. (Nominal.)

Lead Nitrate.—About £116 per ton d/d in casks. MANCHESTER: £110.

Lead, Red.—Basis prices per ton: Genuine dry red lead, £123; orange lead, £135. Ground in oil: red, £144; orange, £156.

Lead, White.—Basis prices: Dry English, in 8-cwt. casks, £131 5s. per ton. Ground in oil, English, under two tons, £149 10s.

Lime Acetate.—Brown, ton lots, d/d, £18 to £20 per ton; grey, 80-82 per cent, ton lots, d/d, £22 to £25 per ton.

Litharge.—£103 per ton.

Lithium Carbonate.—7s. 9d. per lb. net.

Magnesite.—Calcined, in bags, ex works, £27.

Magnesium Carbonate.—Light, commercial, d/d, £70 per ton.

Magnesium Chloride.—Solid (ex wharf), £20 to £25 per ton.

Magnesium Oxide.—Light, commercial, d/d. £160 per ton.

Magnesium Sulphate.—£12 to £14 per ton.

Mercuric Chloride.—Per lb., lump, 7s. 4d.; smaller quantities dearer.

Mercurous Chloride.—8s. to 9s. per lb., according to quantity.

Mercury Sulphide, Red.—Per lb., from 10s. 3d. for ton lots and over to 10s. 7d. for lots of 7 to under 30 lb.

Methanol.—Pure synthetic, d/d, £28 to £38 per ton.

Methylated Spirit.—Industrial 66° O.P. 100 gals., 3s. 7½d. per gal.; pyridinised 64° O.P. 100 gal., 3s. 8½d. per gal.

Nickel Sulphate.—F.o.r. works, 3s. 4d. per lb. (Nominal.)

Nitric Acid.—£24 to £26 per ton, ex works.

Oxalic Acid.—£128 to £133 per ton packed in free 5-cwt. casks.

Paraffin Wax.—Nominal.

Phosphoric Acid.—Technical (S.G. 1.500), ton lots, carriage paid, £61 per ton; B.P. (S.G.1.750), ton lots, carriage paid, 1s. 1d. per lb.

Phosphorus.—Red, 3s. per lb. d/d; yellow, 1s. 10d. per lb. d/d.

Potash, Caustic.—Solid, £65 10s. per ton for 1-ton lots; flake, £76 per ton for 1-ton lots. Liquid, d/d, nominal.

Potassium Bichromate. — Crystals and granular, 9¾d. per lb.; ground, 10¾d. per lb., for not less than 6 cwt.; 1-cwt. lots, ½d. per lb. extra.

Potassium Carbonate.—Calcined, 98/100%, £64 per ton for 1-ton lots, ex store; hydrated, £58 for 1-ton lots.

Potassium Chlorate.—Imported powder and crystals, nominal.

Potassium Chloride.—Industrial, 96 per cent, 6-ton lots, £16.10 per ton.

Potassium Iodide.—B.P., 11s. 1d. to 12s. per lb., according to quantity.

Potassium Nitrate.—Small granular crystals, 76s. per cwt. ex store, according to quantity.

Potassium Permanganate.—B.P., 1s. 7½d. per lb. for 1-cwt. lots; for 3 cwt. and upwards, 1s. 6d. per lb.; technical, £7 9s. 6d. to £8 3s. 0d. per cwt.; according to quantity d/d.

Potassium Prussiate.—Yellow, nominal.

Salammoniac.—First lump, spot, £48 per ton; dog-tooth crystals, £50 per ton; medium, £48 10s. per ton; fine white crystals, £21 to £25 per ton, in casks, ex store.

Salicylic Acid.—MANCHESTER: 1s. 11d. to 3s per lb. d/d.

Soda Ash.—58° ex depôt or d/d, London station, £7 12s. 6d. to £8 7s. 6d. per ton.

Soda, Caustic. — Solid 76/77%; spot, £20 14s. per ton d/d.

Sodium Acetate.—£41-£55 per ton.

Sodium Bicarbonate.—Refined, spot, £11 per ton, in bags.

Sodium Bichromate.—Crystals, cake and powder, 8d. per lb.; anhydrous, 7½d. per lb., net, d/d U.K. in 7-8 cwt. casks.

Sodium Bisulphite. — Powder, 60/62%, £28 7s. 6d. per ton d/d in 2 ton lots for home trade.

Sodium Carbonate Monohydrate.—£25 per ton d/d in minimum ton lots in 2-cwt. free bags.

Sodium Chlorate.—£52 to £57 per ton.

Sodium Cyanide.—100 per cent basis, 8d. to 9d. per lb.

Sodium Fluoride.—D/d, £4 10s. per cwt.

Sodium Hyposulphite.—Pea crystals 22s. 6d. per cwt. (2-ton lots); commercial, 1-ton lots, £16 per ton carriage paid. Packing free.

Sodium Iodide.—B.P., 10s. 2d. per lb. to 12s. 1d. according to quantity.

Sodium Metaphosphate (Calgon).—Flaked, loose in metal drums, £103 ton.

Sodium Metasilicate.—£19 to £19 5s. per ton, d/d U.K. in ton lots.

Sodium Nitrate.—Chilean Industrial, 97-98 per cent, 6-ton lots, d/d station, £20 10s. per ton.

Sodium Nitrite.—£29 10s. per ton.

Sodium Percarbonate.—12½% available oxygen, £7 per cwt. in 1-cwt. drums.

Sodium Phosphate.—Di-sodium, £32 10s. per ton d/d for ton lots. Tri-sodium, £62 per ton d/d for ton lots.

Sodium Prussiate.—9d. to 9½d. per lb. ex store.

Sodium Silicate.—£6 to £11 per ton.

Sodium Silicofluoride.—Ex store, nominal.

Sodium Sulphate (Glauber Salt).—£8 per ton d/d.

Sodium Sulphate (Salt Cake).—Unground. £6 per ton d/d station in bulk. MANCHESTER: £6 10s. per ton d/d station.

Sodium Sulphide. — Solid, 60/62%, spot. £24 per ton, d/d, in drums; broken, £24 15s. per ton, d/d, in casks.

Sodium Sulphite.—Anhydrous, £29 10s. per ton; pea crystals, £20 10s. per ton d/d station in kegs; commercial, £12 to £14 per ton d/d station in bags.

Sulphur.—Per ton for 4 tons or more, ground, £13 18s. 6d. to £16 3s. 6d., according to fineness.

Sulphuric Acid.—168° Tw., £6 2s. to £7 2s. per ton; 140° Tw., arsenic free £4 18s. 6d. per ton; 140° Tw., arsenious, £4 11s. per ton. Quotations naked at sellers' works.

Tartaric Acid.—Per cwt: 10 cwt. or more £8 10s.; 5 to 9 cwt. £8 12s.; 2 to 4 cwt. £8 14s.; 1 cwt. £8 16s.

Tin Oxide.—1-cwt. lots d/d £25 10s. (Nominal.)

Titanium Oxide.—Comm., ton lots, d/d, (56 lb. bags) £102 per ton.

Zinc Oxide.—Maximum price per ton for 2-ton lots, d/d; white seal, £81 10s.; green seal, £80 10s.; red seal, £79.

Zinc Sulphate.—Nominal.

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Arsenic Sulphide.—Yellow, 1s. 9d. per lb.

Barytes.—Best white bleached, £8 3s. 6d. per ton.

Cadmium Sulphide.—6s. to 6s. 6d. per lb.

Carbon Bisulphide.—£37 to £41 per ton, according to quality, in free returnable drums.

Carbon Black.—6d. to 8d. per lb., according to packing.

Carbon Tetrachloride.—£56 to £59 per ton, according to quantity.

Chromium Oxide.—Green, 2s. per lb.

India-rubber Substitutes.—White, 10 5/16d. to 1s. 5½d. per lb.; dark, 10½d. to 1s. per lb.

Lithopone.—30%, £36 15s. per ton.

Mineral Black.—£7 10s. to £10 per ton.

Mineral Rubber, "Rupron."—£20 per ton.

Sulphur Chloride.—7d. per lb.

Vegetable Lamp Black.—£49 per ton.

Vermillion.—Pale or deep, 15s. 6d. per lb. for 7-lb. lots.

Nitrogen Fertilisers

Ammonium Sulphate.—Per ton in 6-ton lots, d/d farmer's nearest station, in October, £10 0s. 6d., rising by 1s. 6d. per ton per month to March, 1950.

Compound Fertilisers.—Per ton d/d farmer's nearest station, I.C.I. No. 1 grade, where available, £10 14s. 6d. I.C.I. Special No. 1, £15 11s., rising by 2s. 6d. per ton per month to June, 1950. National No. 2 raised from £10 8s. 6d. to £10 18s. per ton, due to increase in potash content, as notified in new Board of Trade Order.

"Nitro-Chalk."—£10 4s. per ton in 6-ton lots, d/d farmer's nearest station.

Sodium Nitrate.—Chilean for 6-ton lots d/d nearest station, £11 per ton.

Coal-Tar Products

Benzol.—Per gal. ex works: 90's, 2s. 6d.; pure, 2s. 8½d.; nitration grade, 2s. 10½d.

Carbolic Acid.—Crystals, 10¾d. to 1s. 0½d. per lb. Crude, 60's, 4s. 3d. MANCHESTER: Crystals, 10¾d. to 1s. 0½d. per lb., d/d crude, 4s. 3d., naked, at works.

Creosote.—Home trade, 6½d. to 9¾d. per gal., according to quality, f.o.r. maker's works. MANCHESTER: 6½d. to 9¾d. per gal.

Cresylic Acid.—Pale, 98%, 3s. 9d. per gal.; 99%, 3s. 1d.; 99.5/100%, 4s. 4d. American, duty free, 4s. 2d., naked at works. MANCHESTER: Pale, 99/100%, 3s. 11d. per gal.

Naphtha.—Solvent, 90/160°, 2s. 10d. per gal. for 1000-gal. lots; heavy, 90/190°, 2s. 4d. per gal. for 1000-gal. lots, d/d. Drums extra; higher prices for smaller lots. Controlled prices.

Naphthalene.—Crude, ton lots, in sellers' bags, £8 1s. to £12 13s. per ton according to m.p.; hot-pressed, £14 15s. to £15 14s. per ton, in bulk ex works; purified crystals, £28 to £43 5s. per ton. Controlled prices.

Pitch.—Medium, soft, home trade, 100s. per ton f.o.r. suppliers' works; export trade, £6 to £7 per ton f.o.b. suppliers' port. MANCHESTER: 100s. f.o.r.

Pyridine.—90/140°, 22s. to 23s. per gal.; 90/160°, 21s. MANCHESTER: 19s. to 22s. 6d. per gal.

Toluol.—Pure, 3s. 2d. per gal.; 90's, 2s. 4d. per gal. MANCHESTER: Pure, 3s. 2½d. per gal. naked.

Xylol.—For 1000-gal. lots, 3s. 3½d. to 3s. 6d. per gal., according to grade, d/d.

Wood Distillation Products

Calcium Acetate.—Brown, £15 per ton; grey, £22.

Methyl Acetone.—40/50%, £56 to £60 per ton.

Wood Creosote.—Unrefined, from 3s. 6d. per gal., according to boiling range.

Wood Naphtha.—Miscible, 4s. 6d. to 5s. 6d. per gal.; solvent, 5s. 6d. to 6s. 6d. per gal.

Wood Tar.—£6 to £10 per ton.

Intermediates and Dyes (Prices Nominal)

m-**Cresol** 98/100%.—Nominal.

o-**Cresol** 30/31° C.—Nominal.

p-**Cresol** 34/35° C.—Nominal.

Dichloraniline.—2s. 8½d. per lb.

Dinitrobenzene.—8½d. per lb.

Dinitrotoluene.—48/50° C., 9½d. per lb.; 66/68° C., 1s.

p-**Nitraniline.**—2s. 5d. per lb.

Nitrobenzene.—Spot, 5½d. per lb. in 90-gal. drums, drums extra, 1-ton lots d/d buyers' works.

Nitronaphthalene.—1s. 2d. per lb.; P.G. 1s. 0½d. per lb.

o-**Toluidine.**—1s. per lb., in 8/10-cwt. drums, drums extra.

p-**Toluidine.**—2s. 2d. per lb., in casks.

m-**Xylidine Acetate.**—4s. 5d. per lb., 100%.

Latest Oil Prices

LONDON: October 26. There are no changes in the prices of refined or unrefined oils until November 5. (THE CHEMICAL AGE, *61*, 440).

Borax Prices Raised

A NEW schedule of prices, which will take effect from November 1, has been drawn up by Borax Consolidated, Ltd. Orders already in hand, confirmed for October delivery, are being executed at the old prices (THE CHEMICAL AGE, *61*, 437). The company's new prices for borax and boracic acid, necessitated by increased costs, consequent on devaluation of the £ sterling, are (net per ton delivered):—

	Borax		Boric Acid	
	Commercial	B.P.	Commercial	B.P.
Granular	£36	£45	£64 10s.	£76 10s.
Crystal	£38	£47	£70 0s.	£82 0s.
Powder	£39	£48	£67 10s.	£79 10s.
Powder, extra fine	£40	£49	£69 10s.	£81 10s.
Anhydrous borax	£59 10s.	—	—	—

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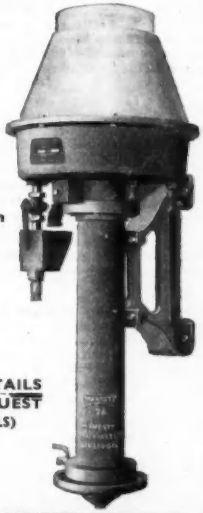

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Two direct electrically under driven **HYDRO EXTRACTORS BY THOS. BROADBENT,** three-point suspension, pit type, with 72 in. diam. galvanised perforated basket. Hand operated brake, non interlocking wire mesh cover. Starter and motor suitable for 400/3/50 cycles.

FILTER PRESS BY JOHNSON, recessed plate type. 69 C.I. plates 40 in. by 40 in., forming cakes 37½ in. by 37½ in. by ¾ in. thick approx. Pyramid surfaces, centre feed 3½ in. diam., individual discharge to each plate. Complete with Johnson double acting piston pump 2½ in. diam. by 6 in. stroke. F. and L. pulley drive.

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FOUR—Andco 2 in. worm-operated **PLUG COCKS.**

ONE—Andco 1½ in. worm-operated **PLUG COCK.**

TEN—Andco 1 in. worm-operated **PLUG COCKS.**

FOURTEEN— ¾ in. worm-operated **PLUG COCKS**

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TWO—All-brass **PRODUCT RECEIVERS,** 2 ft. 11 in. diam. by 4 ft. 9 in. deep.

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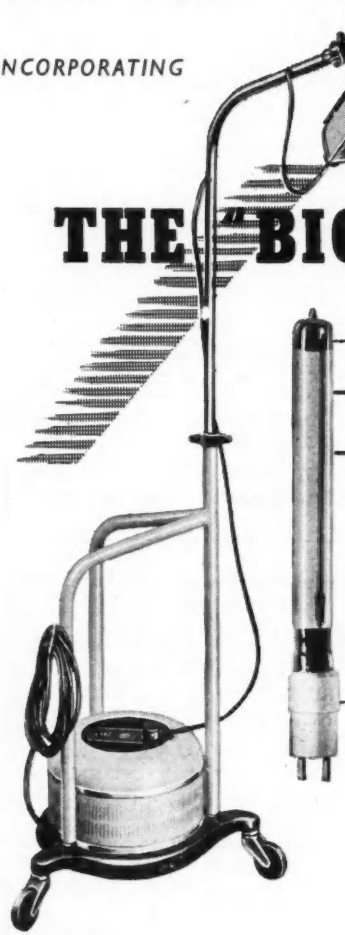

SPECTRAL intensity graph and table showing energy distribution over effective wavelengths with typical 'Biosol' apparatus.

Wave-lengths.	Erythema factor.	Intensity.
A		Micro watts per cm2 at 1 metre
3130	0·03	162·0
3022	0·55	74·0
2967	1·00	36·5
2925	0·70	4·4
2894	0·25	15·0
2804	0·06	30·0
2753	0·07	10·0
2699	0·14	12·5
2652	0·25	58·5
2576	0·49	5·0
2537	0·55	86·0
2483	0·57	31·0
2464	0·57	7·0
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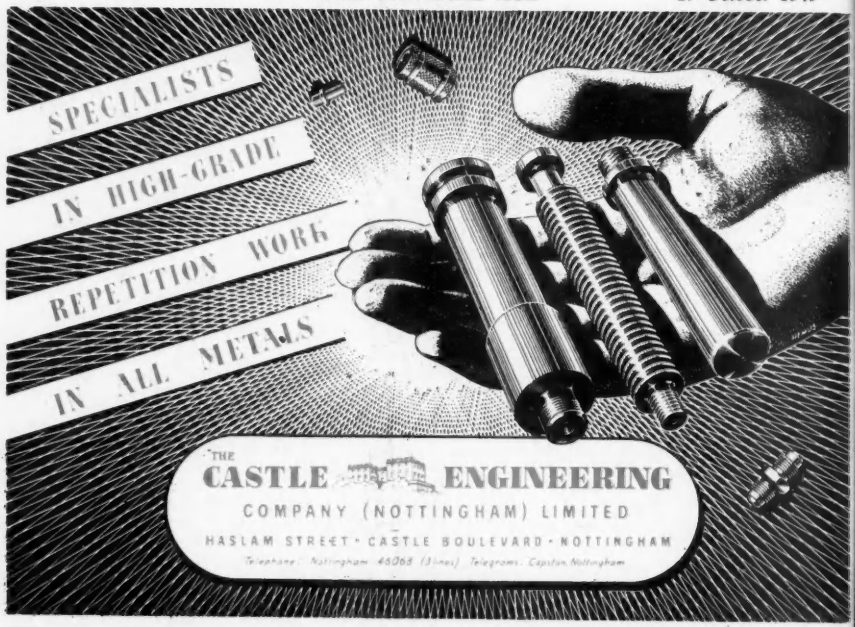

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